Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DEA Reference number:
14/12/16/3/3/2/1033

February 2018

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REPORT DETAILS

Title:	**Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on Portion 0 of the farm Smutshoek 395, north-east of Kenhardt, Northern Cape Province: SCOPING REPORT**
Prepared for:	This Draft Environmental Impact Assessment (Draft EIA) Report forms part of a series of reports and information sources that are being provided during the EIA Process for the proposed Skeerhok PV 1 project. In accordance with the 2014 NEMA EIA Regulations (as amended on 7 April 2017), the purpose of the EIA Report is to: • Present the details of and need for the proposed project; • Describe the affected environment, including the planning context, at a sufficient level of detail to facilitate informed decision making; • Provide an overview of the EIA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; • Provide an Environmental Management Programme (EMPr) for the design, construction and operational phases of the project. The Draft EIA Report is being made available to all stakeholders for a 30-day review period. All comments on the Draft EIA Report (submitted within the 30-day review period) will be considered in the preparation of the finalised EIA Report. This finalised EIA Report will then be submitted to the National Department of Environmental Affairs (DEA), in accordance with Regulation 23 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 24 of the 2014 NEMA EIA Regulations (as amended, 2017).
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CONTENTS

EXECUTIVE SUMMARY

PROJECT OVERVIEW

juwi Renewable Energies (PTY) Ltd is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (132 kV transmission lines for each 100 MW facility) on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult 120, and the connection points to the Eskom Nieuwehoop Substation on the Portion 3 of Gemsbok Bult Farm 120, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 amended NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of each Solar PV facilities. A separate Basic Assessment Process will be undertaken for the development of the proposed transmission line and, associated electrical infrastructure to enable connection to the Eskom Nieuwehoop Substation. The Applicant has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the separate EIA and Basic Assessment (BA) Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development.

Since the proposed 100 MW Solar PV facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Scoping and EIA project and will be lodged for the BA project. Furthermore, separate reports (i.e. BA and Scoping and EIA Reports) will be compiled for each project. The Basic Assessment Report will be made available for Interested and Affected Party (I&AP) review with the EIA Reports.

The proposed 100 MW Solar PV facility projects (requiring a Scoping and EIA Process) are referred to as:

- Skeerhok PV 1;
- Skeerhok PV 2; and
- Skeerhok PV 3.

The proposed 132 kV transmission line project (requiring a BA Process) is referred to as:

- Skeerhok PV Transmission Line.

This Draft EIA Report only discusses the proposed **Skeerhok PV 1** project.

NEED FOR THE PROJECT

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as "IRP 2010") was released by government in 2010, and proposes to develop and secure 17 800 MW of renewable energy capacity by 2030 (including wind, solar and other energy sources). The IRP was updated in 2013. The IRP 2010 has set up a target of 3 725 MW of renewable energy to be produced by Independent Power Producers (IPPs) by 2016. On 18 August 2015, an additional target of 6 300 MW to be procured and generated from renewable energy sources was added to the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) as noted Government Gazette 39111. The additional target allocated for solar PV energy is 2 200 MW.

In 2011, the Department of Energy (DOE) launched the REIPPPP and invited potential IPPs to submit proposals for the financing, construction, operation and maintenance of the first 3 725 MW of onshore wind, solar thermal, solar PV, biomass, biogas, landfill gas or small hydro projects. The two main evaluation criteria for compliant proposals are price and economic development, with other selection criteria including technical feasibility and grid connectivity, environmental acceptability, black economic empowerment, community development, and local economic and manufacturing propositions. The bidders with the highest rankings (according to the aforementioned criteria) are appointed as "Preferred Bidders" by the DOE. The proposed projects aim to contribute to the above strategic imperative.

PROJECT DESCRIPTION

Linked to enhancing its operations within South Africa, the 100 MW Solar PV facility (i.e. Skeerhok PV 1) proposed by juwi will cover an approximate area of 300 hectares (ha). The site (farm) is a total of approximately 4332 ha. Due to the fact that this project only requires 300 ha of land, there is scope to avoid major environmental constraints through the final design of the facility within the development footprint.

The proposed project will make use of PV solar technology to generate electricity from the sun's energy. The Applicant is proposing to develop a facility with a possible maximum installed capacity of 100 MW Alternating Current (AC) of electricity from PV solar energy.

Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. It is proposed that juwi will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which will be assessed separately as part of a BA Process)). Following the construction phase, the proposed transmission line will either be transferred into the ownership of Eskom or remain in the ownership of juwi.

The solar facility will consist of the following components:

- ***<u>Solar Field:</u>***
    - ≤250 ha Free Field Single Axis Tracker or fixed tilt PV – 114 MW DC;
    - Solar module mounting structures comprised of galvanised steel and aluminium;
    - below ground electrical cables connecting the PV arrays to the inverter stations, O&M building and collector substation; and
    - Inverters and mini-subs.

- ***Collector substation:***
  - ≤1 ha 22/33 kV to 132 kV collector substation to receive, convert and step up electricity from the PV facility to the 132 kV grid suitable supply. The facility will house control rooms and grid control yards for both Eskom and the Independent Power Producer. A 32 m telecommunications tower (lattice or monopole type) will be established in the substation area;

- ***O&M area:***
  - Operations and Maintenance (O&M) buildings;
  - ≤1 ha hectare O&M laydown area (near / adjacent substation);
  - ≤0.01 ha solar measuring station;
  - Parking, reception area, offices, guest accommodations and ablution facilities for operational staff, security and visitors;
  - Workshops, storage areas for materials and spare parts;
  - Water storage tanks or lined ponds (~160 kl/day during first 3 months; ~90 kl/day for 21 months during rest of construction period; ~20 kl/day during operation);
  - Septic tanks and sewer lines to service ablution facilities; and
  - Central Waste collection and storage area.

- ***Battery Storage System:***
  - 100 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,120 m^3 of batteries (dangerous goods) and associated operational, safety and control infrastructure;

- ***Access road:***
  - ≤ 15 km long, ≤8 m wide gravel access road running from the transnet service road to the site

- ***Service roads:***
  - ≤10 km of ≤4 m wide gravel internal service roads within the plant boundary;

- ***Other infrastructure:***
  - Perimeter fencing and internal security fencing and gates as required.
  - Access control gate and guard house on access road;
  - ≤3.5 km length of small diameter water supply pipeline connecting existing boreholes to storage.
  - Stormwater channels

- ***Construction Site office area (used during construction and rehabilitated thereafter):***
  - ≤1 ha site office area;
  - ≤ 20 ha laydown area; and
  - ≤1 ha concrete batching plant

NEED FOR AN ENVIRONMENTAL IMPACT ASSESSMENT

As noted above, in terms of the EIA Regulations promulgated under Chapter 5 of the NEMA published in GN R327, R326, R325 and R324 in Government Gazette 40772, dated 7 April 2017, a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area, or, on existing infrastructure".*

Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed project requires authorisation from the National DEA, acting in consultation with other spheres of government.

The purpose of the EIA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The Environmental Assessment therefore needs to show the Competent Authority, the DEA; and the project proponent, juwi, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

APPROACH TO THE EIA PROCESS

The Applications for EA for the Scoping and EIA Projects were submitted to the DEA via courier in September 2017, together with the Scoping Reports for comment. Appendix E of this EIA Report includes the proof of submission (i.e. courier waybills) of the Applications for EA and the Scoping Reports to the DEA. The DEA acknowledged receipt of the Scoping Reports and Applications for EA on 21/09/2017. DEA EIA Reference Numbers were assigned to each Scoping and EIA Project, as noted above.

The Scoping Reports were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from Wednesday 20th September 2017 to Monday 23rd October 2017. The comments received from stakeholders during the 30-day review of the Scoping Report and were incorporated into the Final Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in November 2017, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 22 of the 2014 NEMA EIA Regulations, as amended. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 30 November 2017, which enabled the commencement of the impact assessment phase.

This Draft EIA Report is now being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making. The EIA Report is available in the Kenhardt public library. An electronic version of this report is also available on the following project website: https://www.csir.co.za/environmental-impact-assessment. Written notifications, hard copies and/or CDs containing the document were sent to key stakeholders, including authorities.

The results of the specialist studies and other relevant project information are summarised and integrated into the EIA Report. Part B of this EIA Report includes an Environmental Management Programme (EMPr). The EMPr is based on the recommendations made by specialists for design, construction, operation and decommissioning of the proposed project.

IMPACT ASSESSMENT AND MANAGEMENT ACTIONS

The specialist studies and statements conducted to inform this impact assessment are listed below. All impacts identified and assessed, as well as the proposed mitigation measures and management actions can be found in Chapter 6 and 7. In addition, all the mitigation and management measures proposed by the specialists, including those additional impacts and management measures identified by the EAP have been included in the EMPr (Part B of this Draft EIA Report).

Table 1: Specialist Studies and Statements

Specialist Studies and Statements conducted for the proposed Skeerhok PV 1 Project		
NAME	**ORGANISATION**	**ROLE/STUDY TO BE UNDERTAKEN**
Simon Bundy	Sustainable Development Projects (SDP)	Ecological Impact Assessment (including Terrestrial and Aquatic Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
EXTERNAL REVIEWERS		
Christo Bredenhann	WSP	Review of the Traffic Impact Statement compiled by the CSIR using existing studies in the project area.
Rudolph du Toit	Applied Science Associates (Pty) Ltd	Review of the Social Impact Statement compiled by the CSIR using existing studies in the project area.
Johann Lanz	N/A	Review of the Soils and Agricultural Impact Statement compiled by the CSIR using existing studies in the project area.
Andrea Gibb	SiVEST	External review of the VIA

An Impact Statement for Agriculture, Traffic and Social was also compiled by the EAP and is included in Appendices N1 – N3 of this Draft EIA Report. These statements were externally reviewed (as described in Table 7.1 above) and a letter of confirmation of this is included in each statement. It must be noted that the statements serve as a general description of the existing and predicted impacts associated with the proposed project (using information from existing studies in the area) and does not classify as a specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017). Furthermore, the statements considered the full development (i.e. the development of the three Solar PV Facilities (i.e. Skeerhok PV 1, 2 and 3) and the associated electrical infrastructure (which subject to a separate BA Process).

In addition, a Radio Frequency Interference (RFI) Survey Technical Study was commissioned by the Project Applicant to determine the impact of the proposed project on the SKA. This report is not a standard specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations, as it is a detailed, technical report which provides a cumulative topographical analysis of the proposed PV projects in the Astronomy Geographic Advantage Area and was undertaken to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. The full RFI study can be found in **Appendix P**, and comment from SKA on the proposed Skeerhok PV 1, 2 and 3 projects can be found in **Appendices G and O.**

The table below (Section 7.1, Chapter 6) summarises the overall significance of the impacts following the implementation of the recommended mitigation and management measures. **From this table it can be seen that no negative impacts of high significance are anticipated to occur as a result of this project provided the stipulated management actions are implemented effectively.**

IMPACT ASSESSMENT SUMMARY		
Specialist Study	**Overall Impact Significance Before Mitigation or Enhancement**	**Overall Impact Significance After Mitigation or Enhancement**
Ecological and Hydrological Impact Assessment	Negative: Very Low	Negative: Very Low
Palaeontology/Archaeology/Heritage Impact Assessment	Negative: Low	Negative: Very Low
Visual Impact Assessment	Negative: Moderate	Negative: Low
Avifauna Impact Assessment	Negative: Moderate	Negative: Low
Soils and Agricultural Potential Impact Statement	Negative: Very Low	Negative: Very Low
	Positive: Very Low	*Positive:* Very Low
Traffic Impact Statement	Negative: Low	Negative: Low
Social Impact Statement	Negative: Moderate	Negative: Low
	Positive: Moderate	*Positive:* Moderate

OVERALL EVALUATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Based on the findings of the specialist studies, which all recommend that the proposed project can proceed and should be authorised by the DEA, the proposed project is considered to have an overall **low negative environmental impact and an overall moderate positive social impact** (with the implementation of respective mitigation and enhancement measures).

The proposed project will take place within the Development Envelope. The location of the 300 ha PV facility within the assessed 400 ha Development Envelope will avoid the sensitive ecological and heritage features identified by the respective specialists. An indicative Site Development Plan within the Development Envelope has been produced and included within this report.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans included in the EMPr (Part B of the EIA Report).

The outcomes of this project therefore succeeds in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e. this project is a renewable energy project and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the project will promote justifiable economic and social development.

Taking into consideration the findings of the EIA Process and given the national and provincial strategic requirements for infrastructure development, it is the opinion of the EAP that the project benefits outweigh the costs and that the project will make a positive contribution to steering South Africa on a pathway towards sustainable infrastructure development. Provided that the specified mitigation measures are applied effectively, it is recommended that the project receive EA in terms of the 2014 EIA Regulations (as amended on 7 April 2017) promulgated under the NEMA.

GLOSSARY

AC	Alternating Current
ADT	Average Daily Traffic
AGIS	Agricultural Geo-Referenced Information System
BA	Basic Assessment
BGIS	Biodiversity Geographic Information System
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
CPV	Concentrated Photovoltaic
CSP	Concentrated Solar Power
CSIR	Council for Scientific and Industrial Research
DAFF	National Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DC	Direct Current
DM	Siyanda District Municipality
DMR	National Department of Minerals Resources
DOE	Department Of Energy
DOT	National Department of Transport
DSR	Draft Scoping Report
DWA	National Department of Water Affairs
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Protection Areas
FSR	Final Scoping Report
GA	General Authorization
GG	Government Gazette
GIS	Geographical Information Systems
GN R	Government Notice Regulation
HPM	Hydraulic Plant Module
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
ICB	Iron Chromium Battery
IDP	Integrated Development Plan
IPP	Independent Power Producer

IRP	Integrated Resource Plan
kWh	Kilowatt Hours
LSA	Later Stone Age
Mf	Friesdale Charkonite
Mja	Jacomys Pan Formation
Mks	Klip Koppies Granite
MSA	Middle Stone Age
MW	Megawatts
NBA	South African National Parks
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Protected Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NPAES	National Protected Expansion Strategy
NWA	National Water Act (Act No. 36 of 1998)
PES	Present Ecological State
PPA	Power Purchasing Agreement
PV	Photovoltaic
REDZs	Renewable Energy Development Zones
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
S&EIR	Scoping and Environmental Impact Reporting
SABAP2	South African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SANBI	South African National Biodiversity Institute
SARERD	South African Renewable Energy Resource Database
SDF	Spatial Development Framework
TDS	Total Dissolved Solids
ToR	Terms of Reference
WASA	Wind Atlas of South Africa
WMA	Water Management Area
WULA	Water Use License Application

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 1:

Introduction

CONTENTS

TABLES

FIGURES

KEY INFORMATION TO THIS APPLICATION

Table 1.1: Summary of Project Description

<table>
<tr><th>No.</th><th>Project aspect</th><th>Description</th></tr>
<tr><td>1</td><td>Description of the activity</td><td>juwi Renewable Energies Pty Ltd, “juwi” proposes the construction and operation of a ≤100 MWac solar energy facility (SEF) on Portion 0 of the Farm Smutshoek 395 and associated infrastructure, near Kenhardt in the !Kheis Municipality, in the Northern Cape Province.</td></tr>
<tr><td>2</td><td>Municipality</td><td>!Kheis Municipality</td></tr>
<tr><td>3</td><td>Applicant</td><td>juwi Renewable Energies (Pty) Ltd</td></tr>
<tr><td></td><td>Property details</td><td><table><tr><th>Farm Name</th><th>Farm No.</th><th>Farm Portion</th><th>Surveyor General 21 Digit Code</th></tr><tr><td>Smutshoek</td><td>395</td><td>0</td><td>C03600000000039500000</td></tr></table></td></tr>
<tr><td>4</td><td>Size of the site</td><td>Approximately property size is 4500 hectares (ha).</td></tr>
<tr><td>5</td><td>Development footprint</td><td>Approximately ~300 ha for the PV development (incl. associated infrastructure)
Area assessed ~ 400 ha</td></tr>
<tr><td>6</td><td>Capacity of the facility (in MWac)</td><td>≤100 MWac
100 MWh battery storage facility</td></tr>
<tr><td>7</td><td>Type of technology</td><td>A renewable energy facility comprising of numerous rows of PV (fixed or single axis) modules with associated support infrastructure to generate up to 100MWac electricity.</td></tr>
<tr><td>8</td><td>Structure heights</td><td>• Solar PV panels: approximately 5 m high
• Battery storage facility: approximately 8 m high
• Operations and Maintenance (O&M) buildings: approximately 8 m high
• Collector (on-site) substation approximately: 30 m high including a 32 m high telecoms tower
• On-site 132 kV transmission line: approximately 30 m above ground level</td></tr>
<tr><td>9</td><td>Type of grid connection (substation to which project will connect)</td><td>An overhead 132 kV transmission line will be constructed for the SEF and will extend between the proposed on-site substation and the Eskom Nieuwehoop Substation (to be assessed as part of a separate BA Process).</td></tr>
<tr><td>10</td><td>Other infrastructure (e.g. additional infrastructure, details of access roads, extent of areas required for laydown of materials and equipment, etc.)</td><td>• Perimeter fencing and internal security fencing and gates as required.
• Access control gate and guard house on access road;
• Small diameter water supply pipeline connecting boreholes to storage.
• Batching plant;
• Panel maintenance and cleaning area;
• Stormwater channels and culverts
• Laydown areas
• Access roads</td></tr>
</table>

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS REQUIREMENTS WITH REFERENCE TO RELEVANT SECTIONS OF THIS REPORT

The EIA process undertaken to date has culminated in the production of this Environmental Impact Assessment Report (EIAR). The EIAR provides information relevant to the project and establishes the potential impacts that were assessed in detail from the Scoping Phase, as well as a description of appropriate mitigation measures. This report has been prepared in accordance with the 2014 EIA Regulations, as amended, published in Government Notice No. R 326 of 7 April 2017 and associated guidelines promulgated in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998).

Error! Reference source not found. illustrates how the structure of the EIAR addressed applicable requirements for information in terms of 2014 EIA Regulations, as amended.

Table 1.2: Requirements of an EIA Report as defined in terms of Appendix 3 of GNR 326

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations, as amended (GN R326)	Section	Page
Appendix 3 - (1)(a)	Details of - i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Section 1.7 and Appendix A	Pages 1-30
Appendix 3 - (1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including - i. the 21 digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 1.1, 2.0 and 3.1	Pages 1-3, 1-8, 2-2 and 3-3
Appendix 3 - (1)(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is - i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Section 2.0	Pages 2-2
Appendix 3 - (1)(d)	A description of the scope of the proposed activity, including – i. all listed and specified activities triggered; ii. a description of the activities to be undertaken, including associated structures and infrastructure;	Section 1.1, 2.1, 2.2, 2.3, 2.4 and 4.1	Pages 1-8 to 1-11, 2-2 to 2-14 and 4-4 to 4-6
Appendix 3 - (1)(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 4.2	Pages 4-7 to 4-14

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations, as amended (GN R326)	Section	Page
Appendix 3 - (1)(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 1.5	Pages 1-15 to 1-28
Appendix 3 - (1)(g)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including - i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts – (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; vi. the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. the outcome of the site selection matrix; x. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and xi. a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 3.3, 4.4, Section 5.1, 6.1 - 6.12 and Section 7.3	Pages 4-16 to 4-17; 5-3 to 5-14; 6-3 to 6-15 and 7-3 to 7-6.
Appendix 3 - (1)(h)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including - i. a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; ii. a description of the aspects to be assessed as part of the environmental impact assessment process; iii. aspects to be assessed by specialists; iv. a description of the proposed method of assessing the environmental aspects including aspects to be assessed by	Section 4.6	Pages 4-19 to 4-33

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations, as amended (GN R326)	Section	Page
	specialists; v. a description of the proposed method of assessing duration and significance; vi. an indication of the stages at which the competent authority will be consulted; vii. particulars of the public participation process that will be conducted during the environmental impact assessment process; and viii. a description of the tasks that will be undertaken as part of the environmental impact assessment process; ix. identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.		
Appendix 3 - (1)(i)	An undertaking under oath or affirmation by the EAP in relation to - i. the correctness of the information provided in the report; ii. the inclusion of comments and inputs from stakeholders and interested and affected parties; and iii. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix B	Page 1 to 3
Appendix 3 - (1)(j)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix B	Page 1 to 3
Appendix 3 - (1)(k)	Where applicable, any specific information required by the competent authority;	Appendix H	Pages 5 to 26
Appendix 3 - (1)(l)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Not applicable at this stage	N/A

CHAPTER 1 INTRODUCTION

This chapter provides an introduction (project overview) of the proposed Skeerhok PV 1 Solar Energy Facility, proposed on the Smutshoek Farm 395 Portion 0 near Kenhardt in the Northern Cape. This chapter includes:

- An overview of the motivation or needs and desirability of the proposed PV Facility;
- Information on the Applicant;
- The appointed Environmental Assessment Practitioner (EAP) and the specialist team;
- Objectives of the EIAR; and
- The Requirements for an EIA in terms of Appendix 3 of the 2014 NEMA EIA Regulations, as amended (GN R326).

1.1 Introduction to the Proposed Development of a Solar Energy Facility

Juwi Renewable Energies (Pty) Ltd (hereinafter referred to as "juwi") proposes to construct and operate a 100 MWac Solar Energy Facility (SEF) and associated electrical infrastructure (subject to a separate Basic Assessment Process), on the Smutshoek Farm 395, Portion 0 in the Northern Cape of South Africa. The project, referred to as **Skeerhok PV 1**, will be located approximately 70 km south of Upington and 43 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province. The connection point is the existing Eskom Nieuwehoop substation located on Portion 3 of Gemsbok Bult Farm 120.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations, promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the proposed Skeerhok PV 1 Facility. juwi has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the EIA Process in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activities. Given that energy related projects have been elevated to national strategic importance in terms of the EIA Process, the proposed Solar PV Facility requires authorisation from the National Department of Environmental Affairs (DEA) as the Competent Authority (CA), acting in consultation with other spheres of government.

juwi intends to develop three Solar PV Facilities of 100 MWac each and associated electrical infrastructure (subject to a separate Basic Assessment Process) on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120 near Kenhardt in the Northern Cape. The three proposed projects are indicated in **Error! Reference source not found.** below. This EIAR only considers the proposed development of the Skeerhok PV 1 project (Figure 1.1).

Table 1.3: Three Preferred Solar PV Facilities proposed by juwi near Kenhardt in the Northern Cape

No	Solar PV Project	Project Site
1.	**Skeerhok PV 1**	**Portion 0 of Smutshoek Farm 395**
2.	Skeerhok PV 2	Portion 9 of Gemsbok Bult Farm 120
3.	Skeerhok PV 3	Portion 0 of Smutshoek Farm 395

Since the proposed 3 x 100 MW Solar PV Facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) has been undertaken for the proposed projects. However, three separate Applications for Environmental Authorisation (EA) were prepared and submitted to DEA. Furthermore, three separate Scoping Reports were prepared and submitted to DEA for decision-making. Refer to Appendix E of this EIA Report for the proof of submission (i.e. courier waybills). DEA acknowledged receipt and accepted the Scoping Report in a letter dated 30 November 2017. Three separate EIA Reports were prepared and are hereby submitted to DEA, as well as being sent out for Public Participation.

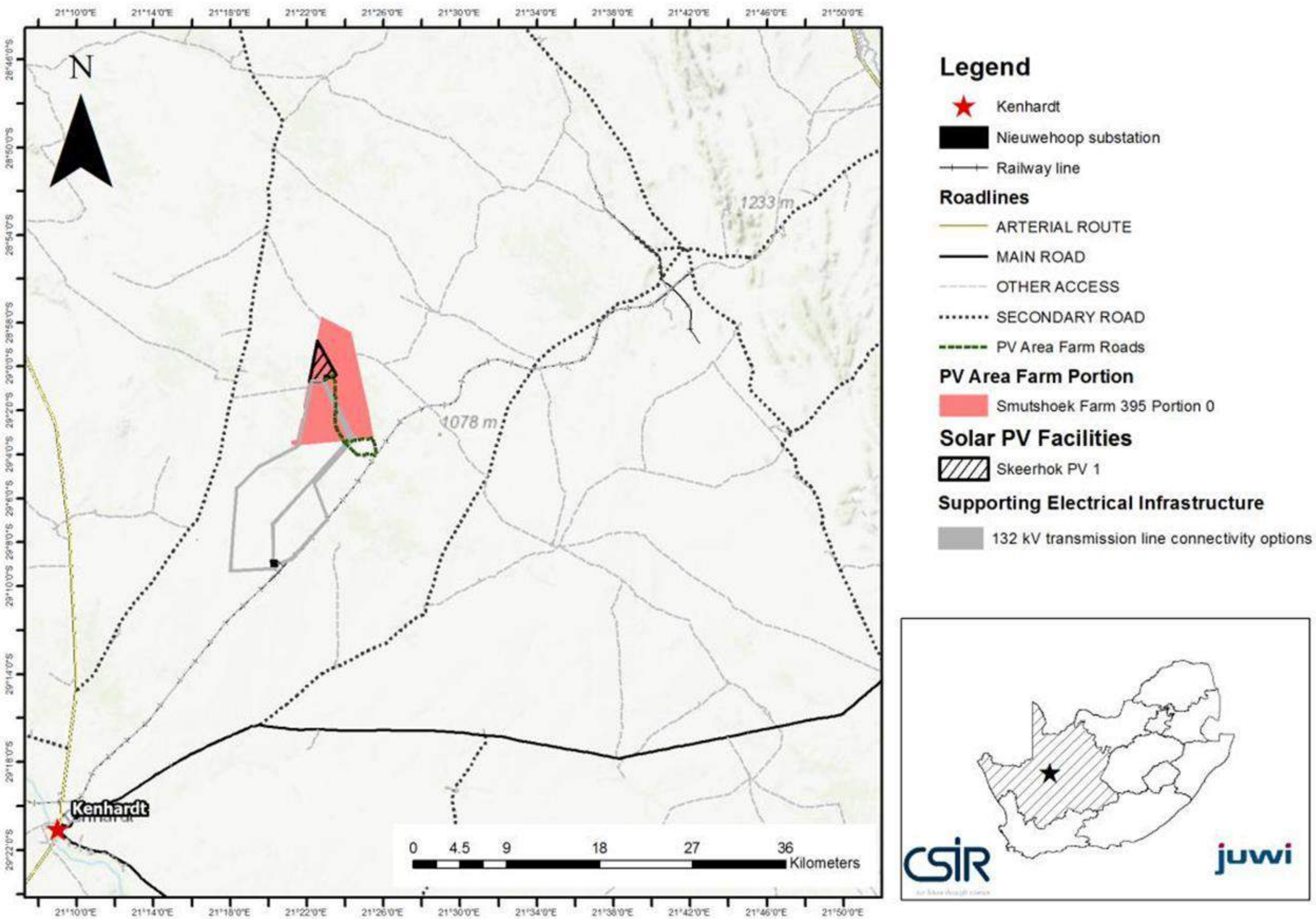

Figure 1.1: Locality map for the proposed Skeerhok Solar Photovoltaic 1 Facility near Kenhardt in the Northern Cape.

The proposed Solar PV Facility will require a development area of approximately ~300 ha. The project will comprise the following main components (which are discussed in more detail in the Project Description Chapter (Chapter 2) of this EIA Report and illustrated below):

- ***Solar Field:***
  - ≤250 ha of photovoltaic (PV) modules mounted on free field single-axis trackers or fixed tilt PV solar module mounting structures comprised of galvanised steel and aluminium; and
  - below ground electrical cables connecting the PV arrays to the inverter stations, O&M building and collector substation; and
  - Ring main units; and
  - Inverters and mini-subs.

- ***Collector substation:***
  - ≤1 ha 22/33 kV to 132 kV collector substation to receive, convert and step up electricity from the PV facility to the 132 kV grid suitable supply. The facility will house control rooms and grid control yards for both Eskom and the Independent Power Producer. A 32 m telecommunications tower (lattice or monopole type) will be established in the substation area;

- ***O&M area:***
  - Operations and Maintenance (O&M) buildings;
  - ≤1 ha O&M laydown area (near / adjacent substation);
  - ≤0.01 ha solar measuring station;
  - Parking, reception area, offices, guest accommodations and ablution facilities for operational staff, security and visitors;
  - Workshops, storage areas for materials and spare parts;
  - Water storage tanks or lined ponds (~160 kl/day during first 3 months; ~90 kl/day for 21 months during rest of construction period; ~20 kl/day during operation);
  - Septic tanks and sewer lines to service ablution facilities; and
  - Central Waste collection and storage area.

- ***Battery Storage System:***
  - 100 MWh Battery Storage Facility with a maximum height of 8m and associated operational, safety and control infrastructure;

- ***Access road:***
  - ≤ 15 km long, ≤ 8 m wide gravel access road running from the Transnet Service Road to the site

- ***Service roads:***
  - ≤10 km of ≤ 8 m wide gravel internal service roads within the plant boundary;

- ***Other infrastructure:***
  - Perimeter fencing and internal security fencing and gates as required.
  - Access control gate and guard house on access road;
  - ≤3.5 km length of water supply pipeline connecting existing boreholes to storage, alternatively water will be supplied by the local municipality.
  - Stormwater drainage

- ***Construction site office area (used during construction and rehabilitated thereafter):***
  - ≤1 ha site office area;
  - ≤ 10 ha laydown area; and
  - ≤1 ha concrete batching plant

The 100 MWac PV Facility will connect to the Eskom Nieuwehoop Substation located on the Portion 3 Gemsbok Bult Farm 120 via a 132 kV overhead transmission line (the development of the 132 kV line will be considered under a separate Basic Assessment process). EA for the construction of the 400/132 kV Eskom Nieuwehoop Substation was granted on 21 February 2011 by the DEA (DEA reference number: 12/12/20/1166). An EA (DEA reference number: DEA Reference Number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), dated 14 February 2014, granted authorisation to Eskom Holdings SOC Limited to construct, *inter alia*, the following within the existing development footprint of the Nieuwehoop Substation:

- 2 x 400 kV transformer feeder bay;
- A 400 / 132 kV transformer;
- 132 kV busbar;
- 400 / 132 kV 500 MVA x 3 transformers; and
- 8 x 132 kV feeder bays and associated lines.

A maximum of 30 km of overhead line, connecting the on-site substation to the Nieuwehoop Substation is proposed.

A detailed project description (based on the conceptual design) is provided in Chapter 2 of this EIA Report.

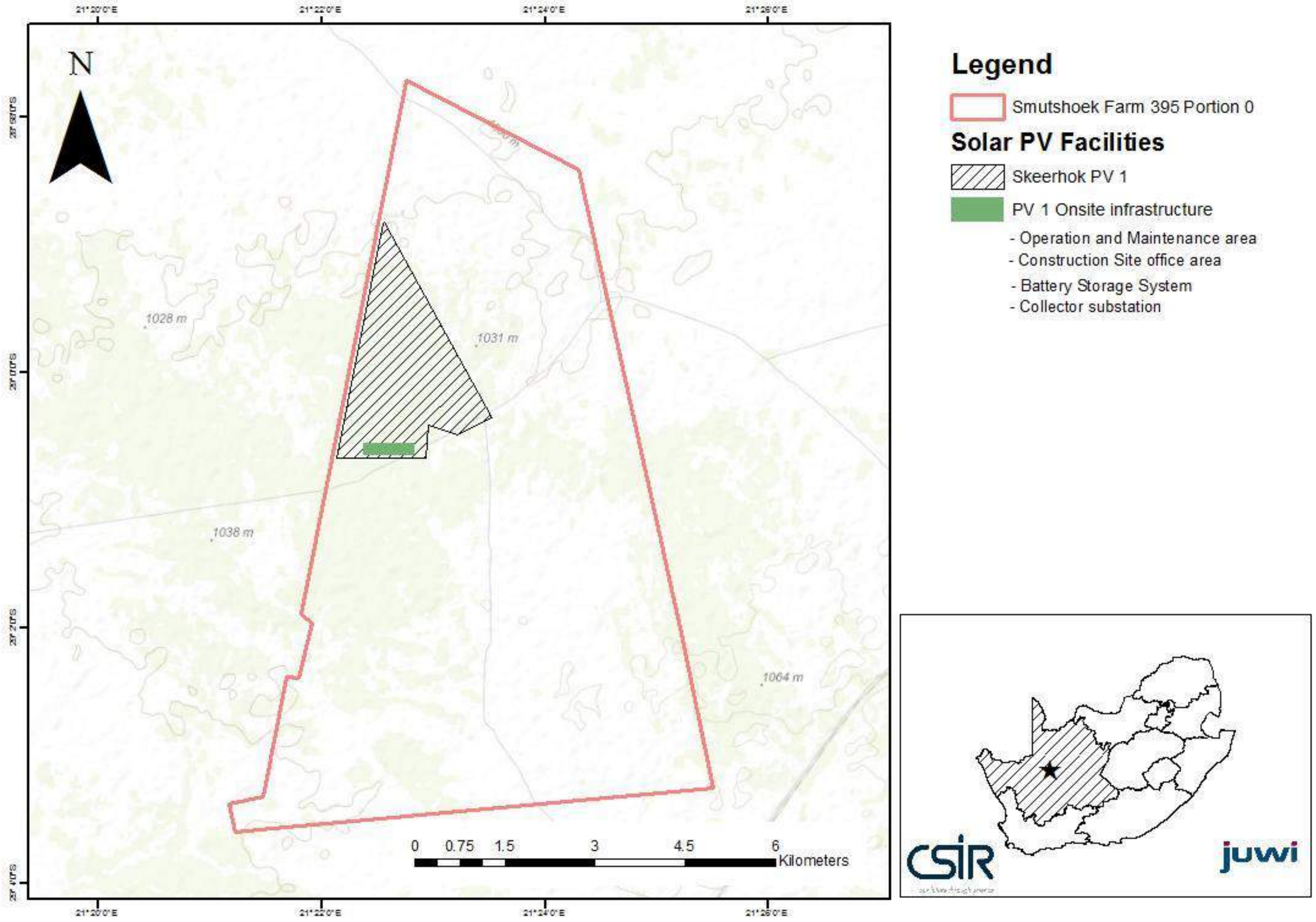

Figure 1.2: Plan locating the main components of the proposed Skeerhok PV 1 project on Portion 0 of Smutshoek Farm 395

1.2 Requirements for an EIA

As noted above, in terms of the EIA Regulations, as amended, promulgated under Chapter 5 of the NEMA published in GN R326, R327, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- "The development of facility or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure".

Chapter 4 of this EIA Report contains the detailed list of activities contained in R327, R325 and R324 which may be triggered by the various project components and thus form part of the EIA Process.

The purpose of the EIA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The environmental assessment therefore needs to show the CA, the DEA, and the project applicant, juwi, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

1.3 Project Applicant and Project Overview

juwi Renewable Energies Pty Ltd is part of the international juwi Group, one of the world's leading companies in the area of renewable energy. juwi South Africa focuses on Solar and Wind Energy, and works with landowners, project developers, technology providers, regulators and investors to source and develop renewable energy projects. juwi acts as the project interface, coordinating the research and studies, the site identification, the project structure, environmental impact assessments, selecting the strategic partners, arranging financing, ensuring bid compliance and bidding under the Department of Energy's (DoE) Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and reaching financial closure.

1.4 Project Motivation (Including Need and Desirability)

The need for renewable energy is becoming increasingly apparent, in both local and international context, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation. The urgency behind this evolution can be appreciated considering that South Africa is the largest emitter of greenhouse gases in Africa, accounting for as much as 42% of the continent's total emissions, and is also estimated to rank amongst the top 20 largest emitters of greenhouse gases in the world. These emissions are largely a result of an energy-intensive economy and high dependence on coal-based electricity generation. The South African government is therefore committed to supplementing the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thus creating the framework that will lead to an increase in the supply of clean energy for the nation.

South Africa is subject to some of the highest levels of solar radiation in the world with an average daily solar radiation that varies between 4.5 kilowatt hours per square metre per day (kWh/m^2 /day) and 6.5 kilowatt hours per square metre per day (kWh/m^2/day). This, in comparison to about 3.6kWh/m^2/day for parts of the United States and about 2.5kWh/m^2/day for Europe and the United Kingdom (Department of

Energy, 2016), reveals that South Africa has considerable solar resource potential which should be exploited. On a provincial level, the Northern Cape is considered to be the best location for solar energy development in South Africa, due to its exceptionally high solar resource, flat and sparsely populated land, good transport, electricity grid infrastructure and the low population density. The average solar radiation in the Northern Cape ranges from 2200 kWh/m^2 per annum to 3200 kWh/m^2 per annum. On an annual scale, the Northern Cape received the most incoming solar radiation throughout the years (1980 to 2009), followed by North West and Free State. KwaZulu-Natal received least amount of mean monthly solar radiation in comparison with other provinces.

The Kenhardt area has an average solar radiation between 2200-2300 kWh/m^2/ per annum and is one of the best locations, within the Northern Cape for solar power generation. Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within KwaZulu-Natal, Eastern Cape and Western Cape mainly have a solar radiation between 1500 kWh/m^2 and 1700 kWh/m^2 per annum, which is not completely feasible for solar energy projects.

The establishment of the proposed PV power generation facility would strengthen the existing electricity grid for the area. Additionally, the project would contribute towards meeting the national energy target as set by the Department of Energy (DoE) and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030.

Should the proposed site and development identified by juwi be acceptable, it is considered viable that long term benefits for the community and society in the Kenhardt area would be realised. The towns in the Northern Cape are generally small with limited job opportunities, and the proposed project will provide an opportunity for additional employment in an area where job creation is identified as a key priority. Approximately 1600 (600 direct and 1000 indirect) employment opportunities will be created during the construction period and 200 (50 direct and 150 indirect) employment opportunities will be created during the operation period of the proposed project.

The proposed project would also have international significance as it contributes to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, United Nations Convention on Biological Diversity (UNCBD) and the 2017 Paris Agreement, all of which South Africa is a signatory to. Renewable energy is critical to South Africa as this source of energy is recognised as a major contribution to climate protection, has a much lower environmental impact, as well as advancing economic and social development.

1.5 Need and Desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published in the Government Gazette of 20 October 2014. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. **Error! Reference source not found.** includes a list of questions based on the DEA's Guideline to determine the need and desirability of the proposed project. It should be noted this table was informed by the outcomes of the Scoping and EIA Process.

Table 1.4: The Guideline on the Need and Desirability's list of 14 questions to determine the "Need and Desirability" of a proposed project

NEED	
Question	**Response**
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area)?	
1.1. How were the following ecological integrity considerations taken into account?: 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4. Conservation targets, 1.1.5. Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	**The environmental sensitivities present on site were assessed within the ecological impact assessment undertaken during the EIA phase of this project.** **The specialist identified all ecological sensitive areas on site that have to be avoided by the proposed development as well as how to suitably develop within these areas so that the ecological integrity of the areas is maintained.** **The sensitivity map is included in Chapter 3 of this Report.**
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**The environmental sensitivities present on site were assessed within the ecological impact assessment undertaken during the EIA phase of this project.** **The specialist identified all ecological sensitive areas on site that have to be avoided by the proposed development as well as how to suitably develop within these areas so that the ecological integrity of the areas is maintained.** **The sensitivity map is included in Chapter 3 of this EIA Report.** **Measures to avoid, remedy, mitigate and manage impacts are included within the compiled Environmental Management Programme (EMPr), included as Part B of the Report, which forms part of this EIA Report.**
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided	**Measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr, which forms part of this EIA Report.**

NEED	
Question	**Response**
altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	**Potential impacts associated with the proposed project, including waste generation are included in Chapter 6 of this EIA Report, as well as in the Environmental Management Programme included as Part B of this Report. Measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr (Part B of the Report), which forms part of this EIA Report.**
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**A Heritage Impact Assessment was undertaken as part of the assessment for this project. A Heritage profile is included in Chapter 3 of this Report, as well as in Appendix K. The applicable measures to avoid, remedy, mitigate and manage impacts are included in Appendix K, as well as in the EMPr included as Part B of this EIA Report.**
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**An Ecological Assessment has been undertaken with regards to the proposed project; the assessment includes a detailed profile of the natural environment and anticipated impacts. Measures to avoid, remedy, mitigate and manage impacts are included in the EMPr (Part B of this EIA Report).**
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and	**The proposed project aims to harness the sun's light for the generation of electricity. This project is seen as a source of 'clean energy' and reduces the dependence on non-renewable sources, such as coal fired power plants.** **The proposed project is a sustainable option for the area and the proposed footprint will be placed to ensure avoidance and/or mitigation of any potential impacts to the receiving environment.**

NEED	
Question	**Response**
energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life) 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?: 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge? 1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	**The precautionary approach has been adopted for this assessment, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts.** **Current gaps in knowledge include the preferred technology to be used and the number of other solar facilities that will be constructed in the area. Ways in which these gaps are addressed is to consider all types of solar technologies as part of the assessment and to consider the cumulative impact of all solar facilities being developed within the area.**
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: 1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	**This is considered and addressed as part of the desktop review of previous social assessments undertaken in the area for similar types of projects (included in Appendix N).** **An EMPr (Part B) has been compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of the solar facility in a rural landscape. The visual impact has been assessed as part of the Visual Impact Assessment (Appendix M of this EIA Report).**

NEED	
Question	**Response**
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	**This is considered and addressed as part of the desktop review of previous social assessments undertaken in the area for similar types of projects (included in Appendix N).**
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	**The proposed activity does not compromise any of the objectives set within the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. The proposed solar energy facility will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA). However, as noted above, employment opportunities will be temporary during the construction phase and long-term during the operational phase as the plant is expected to be operational for 20 years.**
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	**Please refer to Chapter 5 of this EIA Report.**
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	**Please refer to Chapter 6 of this EIA Report.**
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:	

NEED	
Question	**Response**
2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	**The !Kheis Municipality Draft Integrated Development Plan (IDP) (2012 – 2017 and 2015 – 2019) states that an opportunity exists to utilise solar energy more widely and lessen the dependence on wood and fire. This opportunity has been identified because not all people within the municipal area have access to electricity. Even though this solar facility will not provide the municipality directly with electricity, the energy produced by the facility will feed into the national grid. Furthermore, the DEA have commissioned a Strategic Environmental Assessment (SEA) to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The SEA aims to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as Renewable Energy Development Zones (REDZs). The proposed solar facility falls within one of the potential eight REDZ areas. Therefore, should the REDZ be established and renewable projects operate within these areas, Eskom may be able to unlock funding to proactively construct grid infrastructure to facilitate generation capacity from these areas. This will mean that the municipality will also benefit from these upgrades and potentially alleviate the electrification backlogs present in the area.** **One of the priority issues identified within the !Kheis Municipality IDP (2012 – 2017 and 2015 – 2019) is the low levels of skilled people, as well as high levels of poverty and unemployment. The IDP (2012 – 2017 and 2015 – 2019) states that the objective to resolve this issue is to create an environment whereby the local community is empowered through capacity building and skills development (particularly for the youth). The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DEA). It is estimated that approximately 600 direct and 1000 indirect employment opportunities will be created during the construction phase. During the operational phase, approximately 50 direct and 150 indirect employment opportunities will be created. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.**

NEED	
Question	**Response**
	Therefore, the proposed SEF would help to address the need for increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. **The proposed activity does not compromise any of the objectives set within the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. The proposed Solar Energy Facility will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA).**
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.),	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	**The impact on sensitive natural areas would be limited. The larger 400 ha buildable area was considered and assessed by the specialists in order to ensure that any development constraints or sensitive natural areas are avoided in the final siting of the proposed facility. The impact of the proposed project on cultural/heritage areas (archaeology and palaeontology) have been assessed in the form of a Heritage Impact Assessment attached as Appendix K. Due to sensitive heritage features present on site, the site layout has been amended to avoid these features. Please see Chapter 3 for an amended site layout map including the avoided sensitive features.** **The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed project proceed, approximately 300 ha of the land will be developed on and it is not expected that this will significantly threaten the agricultural activities present on site. A Soils and Agricultural Potential Impact Statement (Appendix N) was compiled using the extensive existing information available and is included within the EIA Report to reflect the impact of the proposed project in terms of the land use and agricultural potential.**

NEED	
Question	**Response**
	As noted, an EMPr was compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of the solar facility in a rural landscape. The visual impact and considerations have been assessed in the Visual Impact Assessment which is attached as Appendix M. An environmental sensitivity map is included in Chapter 3, based on the input obtained from the various specialist studies. Where possible sensitive features have been avoided by layout revisions.
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	**The 2012 !Kheis LED Strategy states that a great opportunity exists for the generation of green energy in the area, particularly solar energy, due to the area experiencing longer daylight hours, that is longer sunshine hours.**
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	**This is addressed and included within the Social Impact Assessment (Appendix N).**
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	**This is addressed and included within the Social Impact Assessment (Appendix N).**
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	**This is addressed and included within the Social Impact Statement (Appendix N).**
2.5. In terms of location, describe how the placement of the proposed development will:	
2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.2. reduce the need for transport of people and goods,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use. This project is a renewable energy project and not a**

NEED		
Question		Response
	result in densification and the achievement of thresholds in terms public transport),	**transportation project.**
2.5.4.	compliment other uses in the area,	**The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed project proceed, approximately 300 ha of the land will be developed on and it is not expected that this will significantly threaten the agricultural activities present on site. A Soils and Agricultural Potential Impact Statement is included within the EIA Report (Appendix N) to reflect the impact of the proposed project in terms of the land use and agricultural potential.**
2.5.5.	be in line with the planning for the area,	
2.5.6.	for urban related development, make use of underutilised land available with the urban edge,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.7.	optimise the use of existing resources and infrastructure,	**The proposed project will connect to the existing Eskom Nieuwehoop Substation and will make use of the Transnet Service Road as an access road until the access road traverses the greater project area, i.e. enters farm Gemsbok Bult Portion 9.**
2.5.8.	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	**This project is a renewable energy project and not related to bulk infrastructure expansion.**
2.5.9.	discourage "urban sprawl" and contribute to compaction/densification,	**Not applicable as the project is not proposed in an urban area where social impacts are expected to manifest.**
2.5.10.	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.11.	encourage environmentally sustainable land development practices and processes,	**Based on the findings of this EIA, the proposed project would not have a significant (“high”) negative impact on the receiving environment, with the implementation of suitable mitigation measures. No impacts of high significance (with the implementation of mitigation measures) were identified in the EIA. As noted in Appendix N of this EIA Report (Soils and Agricultural Potential Impact Statement), due to the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. Currently, the site is used for grazing, which could continue in the surrounding regions, together with the generation of additional income via the leasing of the land to the Applicant.**

NEED	
Question	**Response**
	It is also important to point out that the proposed project will be designed according to relevant national specifications and standards which are regarded as best practice in the renewable energy sector.
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	**Please refer to Chapter 2 for a description of the process undertaken to identify the site is a preferred site for a Solar Energy Facility**
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	**This is addressed and included within the Social Impact Statement (Appendix N).**
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	**The impact of the proposed project on cultural/heritage areas (archaeology and palaeontology) was assessed and forms Appendix K of this EIA Report.**
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	**Several SEFs are proposed in the area, which lends itself potentially to a renewable energy development area.** **The proposed solar facility falls within one of the potential eight REDZ areas. Therefore, should the REDZ be established and renewable projects operate within these areas, Eskom may be able to unlock funding to proactively construct grid infrastructure to facilitate generation capacity from these areas. This will mean that the municipality will also benefit from these upgrades and potentially alleviate the electrification backlogs present in the area.**
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	**This is addressed and included within the Social Impact Statement (Appendix N).**
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	

<table>
<tr><th colspan="2">NEED</th></tr>
<tr><th>Question</th><th>Response</th></tr>
<tr><td colspan="2">2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:</td></tr>
<tr><td>2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</td><td rowspan="7">This is addressed and included within the Social Impact Statement (Appendix N).</td></tr>
<tr><td>2.7.2. Positive impacts. What measures were taken to enhance positive impacts?</td></tr>
<tr><td>2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?</td></tr>
<tr><td>2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?</td></tr>
<tr><td>2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?</td></tr>
<tr><td>2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?</td></tr>
<tr><td>2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?</td></tr>
<tr><td colspan="2">2.13. What measures were taken to:</td></tr>
<tr><td>2.13.1. ensure the participation of all interested and affected parties,</td><td rowspan="2">The PPP undertaken to date as part of the Scoping and EIA process is included in this EIA Report. Various methods have been employed to notify potential (I&APs) of the proposed project, namely, through adverts, site notices on site and in Kenhardt and notification letters.</td></tr>
<tr><td>2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</td></tr>
</table>

NEED	
Question	**Response**
2.13.3. ensure participation by vulnerable and disadvantaged persons,	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	**The EIA process has taken cognisance of all interests, needs and values espoused by all interested and affected parties. Opportunity for public participation will be provided to all I&APs throughout the EIA process in terms of the 2014 EIA Regulations, as amended.**
2.13.5. ensure openness and transparency, and access to information in terms of the process,	**The PPP undertaken to date as part of the Scoping is included in this EIA Report. This will be updated with the PPP undertaken during the distribution of the Draft EIA Reports. Various methods have been employed to notify potential (I&APs) of the proposed project, namely, through adverts, site notices on site and in Kenhardt and notification letters.**
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	**The EIA process has taken cognisance of all interests, needs and values adopted by all interested and affected parties.**
2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted.	**Public participation of all I&APs has been promoted and opportunities for engagement will be provided throughout the EIA process.**
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	**The proposed project presents viable long term benefits for the community and society in the Kenhardt area. Recommendations made within the Social Impact Statement (included in Appendix N of this EIA Report) and those included in the EMPr section of this Report (Part B) have the potential to facilitate more options to local community members in terms of socio-economic benefits.**
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	**An EMPr has been developed to address health and safety concerns. An Environmental Control Officer will be appointed to monitor compliance.**
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created,	**This is addressed and included within the Social Impact Statement (Appendix N).**
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills	

NEED	
Question	**Response**
match the skills available in the area),	
2.16.3. the distance from where labourers will have to travel,	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,	**Legislation, policies and guidelines, which could apply to impacts of the proposed project on the environment, have been considered. The scope and content of this EIA Report has been informed by applicable integrated environmental management legislation and policies. Chapter of this EIA Report and the specialist studies included in this Report also provide a description of the relevant applicable legislation that the proposed development complies with.**
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	**Public Participation has been undertaken as part of the Scoping Phase for this EIA process, and to this date the CSIR has not received information on potential conflicts of interest.**
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	**Public participation forms an integral part of the Environmental Assessment Process and assists in identifying issues and possible alternatives to be considered during the EIA Process.**
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	**The proposed mitigation measures included in the EMPr (Part B) of this Report have been informed by the Specialist studies undertaken and this includes a detailed assessment of the environment as well as the impacts associated with the proposed development. Solar energy facilities can be dismantled and completely removed from the site leased for the development and do not permanently prevent alternative land-uses on the same land parcel. Based on material and socio-economic terms, and measured to the value of the best alternative that is not chosen, the proposed project will result in positive opportunity costs.**
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health	**The EMPr (Part B) of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the applicant.**

NEED	
Question	**Response**
effects will be paid for by those responsible for harming the environment?	
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	**Due to both the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. The site is within one of South Africa's eight proposed Renewable Energy Development Zones (REDZs), and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors. These factors include an assessment of the significance of the loss of agricultural land. Renewable energy development is therefore a very suitable land use option for the site. The proposed solar energy facility would however be more robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed project would also provide the farm owner with additional income by way of lease agreements (as explained above) and will also contribute to local socio-economic upliftment through job creation.**
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	**In assessing the cumulative impacts of the proposed development, all the projects that fall within a 20 km radius of the proposed skeerhok projects were considered. The cumulative impact assessment also assumes that a total of six approved renewable energy developments will be approved for construction. The incidence and severity of the in-migration of job seekers and increases in social deviance are likely to increase with the development of more SEFs in the area. The cumulative socio-economic benefit offered by industrial scale development in the area outweighs the negative impacts associated with economic growth. The cumulative impact of the proposed development is therefore considered to be of moderate significance.**

1.6 EIA Team

As previously noted, the CSIR has been appointed by juwi to undertake the EIA required for the proposed project. Public participation forms an integral part of the EIA Process and assists in identifying issues and possible alternatives to be considered during the EIA Process. The CSIR is undertaking the PPP for this EIA. Details on the PPP are included in Chapter 4 of this Environmental Impact Assessment Report.

The EIA team which is involved in this Scoping and EIA Process is listed in **Error! Reference source not found.** below. This team includes a number of specialists which have either been involved to date, or are planned to provide inputs during the EIA Process.

Table 1.5: The EIA Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Environmental Management Services (CSIR)		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	Project Leader (*Pr. Sci. Nat.)*
Kelly Stroebel	CSIR	Project Manager (Appointed EAP)
Babalwa Mqokeli	CSIR	Project Officer
Specialists		
Simon Bundy	Sustainable Development Projects (SDP)	Ecological Impact Assessment (including Terrestrial Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr. John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Christo Bredenhann	WSP	Review of the Traffic Impact Statement complied by CSIR using existing information.
Rudolph du Toit	N/A	Review of the Social Impact Statement complied by CSIR using existing information.
Johann Lanz	N/A	Review of the Soils and Agricultural Potential Impact Statement complied by CSIR using existing information.

Due to the proximity of the proposed project to identical projects, existing information has been used to provide impact statements for soils and agricultural potential, social issues and traffic impact. These impact statements have been included in this Draft Environmental Impact Assessment Report (DEIAR) and have been reviewed by qualified specialists in the respective fields. Please see Appendix N for the inclusion of these statements.

juwi has appointed the services of an Square Kilometre Array (SKA) approved specialist to conduct RFI and Electromagnetic Interference (EMI) based studies to determine the level of mitigation shielding required in order to comply with the SKA Regulations. Please refer to Chapter 7 for the ToR's for the RFI study. The findings of this assessment have been provided to the SKA for consideration and comment. The comments received from SKA have been included in Appendix O.

1.7 Details and Expertise of the Environmental Assessment Practitioner

Kelly Stroebel is a Junior EAP in the EMS group of the CSIR and holds an Honours degree in Environmental Science. She has been the Project Manager of several EIAs in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has also assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA which were commissioned by the national Department of Environmental Affairs.
Kelly will be supported by the EIA Project Team as outlined within **Error! Reference source not found.**.

1.8 Objectives for this EIA Report

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Reports were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 20 September 2017 to 23 October 2017. The comments received from stakeholders during the 30-day review of the Scoping Report were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA on the 3rd of November 2017, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, as amended, for decision-making in terms of Regulation 22 of the 2014 NEMA EIA Regulations. It is important to note that (for the purpose of completeness and continuity), the comments received from I&APs during the Scoping Phase have been included in Appendix G of this EIA Report. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 30 November 2017, which marked the end of the Scoping Phase (Appendix O this EIA Report), after which the EIA Process moved into the impact assessment and reporting phase. For background on the Scoping Process, the reader is referred to the Scoping Report (CSIR, 2017).

This EIA Report is currently being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making.

The primary objective of this EIA Report is to present stakeholders, I&APs and the Competent Authority, the DEA, with an overview of the predicted impacts and associated management actions required to avoid or mitigate the negative impacts; or to enhance the benefits of the proposed project.

In broad terms, the amended 2014 NEMA EIA Regulations (GN R326) stipulates that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA, and that it must include a description of the potential environmental impacts, mitigation and closure outcomes, as well as the residual risks of the proposed activity.

Based on the 2014 NEMA EIA Regulations, the objectives of the EIA Process is to:

- determine the policy and legislative context within which the activity is located and note how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated;

- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Appendix 3 of the amended 2014 NEMA EIA Regulations (as noted in Regulation 23 (3) of the GN R326). This section regulates and prescribes the content of the EIA Report and specifies the type of supporting information that must accompany the submission of the EIA Report to the Competent Authority. An overview of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations are addressed in this EIA Report is presented in **Error! Reference source not found.**.

As noted in Regulation 23 (4) of the GN R326, the EMPr that is required as part of the EIA Process is provided in Part B of this EIA Report and has been structured to comply with the requirements outlined in Appendix 4 of the 2014 NEMA EIA Regulations, as well as the requirements of DEA's acceptance of the Scoping Report and Plan of Study for EIA (as shown in Appendix O of this EIA Report). An overview of this compliance is shown in Part B of this EIA Report. In addition, the specialist studies that have been conducted as part of the EIA Phase need to comply with Appendix 6 of the amended 2014 NEMA EIA Regulations. Each specialist study (Appendix I to Appendix N) provides an overview table showing compliance with the regulations.

Furthermore, this process is designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the amended 2014 NEMA EIA Regulations relating to the PPP and, specifically, the registration of and submissions from I&APs.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 2:

Project Description

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TABLES

FIGURES

CHAPTER 2. PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and an overview of the site and technology selection process for the Skeerhok PV 1 Solar Energy Facility (SEF), referred to as Skeerhok PV 1, as provided by juwi.

The purpose of this chapter is to present sufficient project information on the proposed Solar PV facility (including the facility itself and the associated infrastructure) to inform the EIA Process in terms of design parameters applicable to the project.

As noted previously, the proposed project will take place on Portion 0 of Smutshoek Farm 395 (Surveyor General 21-Digit Code: C03600000000039500000) near Kenhardt in the Northern Cape. The co-ordinates of the boundary/corner points of the preferred project site (Skeerhok PV 1) are shown in Table 2-1 and Figure 2-1 below.

Table 2-1: Co-ordinates of the Corner Points of the Preferred Project Site

Site	Point	Latitude	Longitude
Skeerhok PV 1	A	28°58'40.53"S	21°22'33.22"E
	B	29° 0'34.53"S	21°22'7.80"E
	C	29° 0'33.31"S	21°22'58.19"E
	D	29° 0'18.99"S	21°22'57.80"E
	E	29° 0'23.75"S	21°23'12.96"E
	F	29° 0'15.74"S	21°23'31.92"E

2.1. Key Components of the Proposed Solar Energy Facility

A summary of the key components of the proposed project is described below. It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of an EA, should such an authorisation be granted for the proposed project).

The project is being developed with a maximum possible installed capacity of 114 MWdc which produces 100 MWac of electricity. As mentioned in Chapter 1 of this EIA Report, once commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years. The property on which the SEF is to be constructed will be leased by the project owner from the property owners for the life span of the project. The assessed area includes approximately 400 ha of land in total. Due to the fact that the solar PV facility requires approximately 300 ha of land, there is spatial scope to avoid major environmental constraints through optimisation of the final design of the solar facility. **Error! Reference source not found.** indicates a layout of these project areas in relation to Skeerhok PV 1.

The larger 400 ha buildable area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Chapter 7 of this EIA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the larger 400 ha site that was assessed. Based on this map, the preferred location for the 300 ha Skeerhok PV 1 facility, also known as the Development Envelope, avoids (where possible) the sensitive features that were identified by the specialists within the original 400 ha assessed area. Based on the boundaries of the Development Envelope and the constraints of the environmental sensitivities, a site layout has also been preliminarily determined for this project (as discussed in Chapter 7 of this EIA Report).

It should be noted that even though a site layout has been provided (as shown in Figure 2-2), should the layout change following the issuing of the EA (should it be granted), that any alternative layout occurring within the boundaries of the Development Envelope would *not* change the scope of work or the *findings* of the impact assessments undertaken during this EIA. The Development Envelope is considered to be a "box" in which the proposed project components discussed within this chapter can be constructed at whichever location (**within the boundaries of the assessed Development Envelope)** without requiring an additional assessment or change in impact significance. Any changes to the layout are therefore considered to be non-substantive. This is discussed further in Chapter 7 of this EIA Report. It should be noted that a similar approach has been followed for the electrical infrastructure and transmission lines, which has been assessed as part of a separate Basic Assessment Processes. To this end, an electrical infrastructure corridor has been proposed for proposed transmission lines.

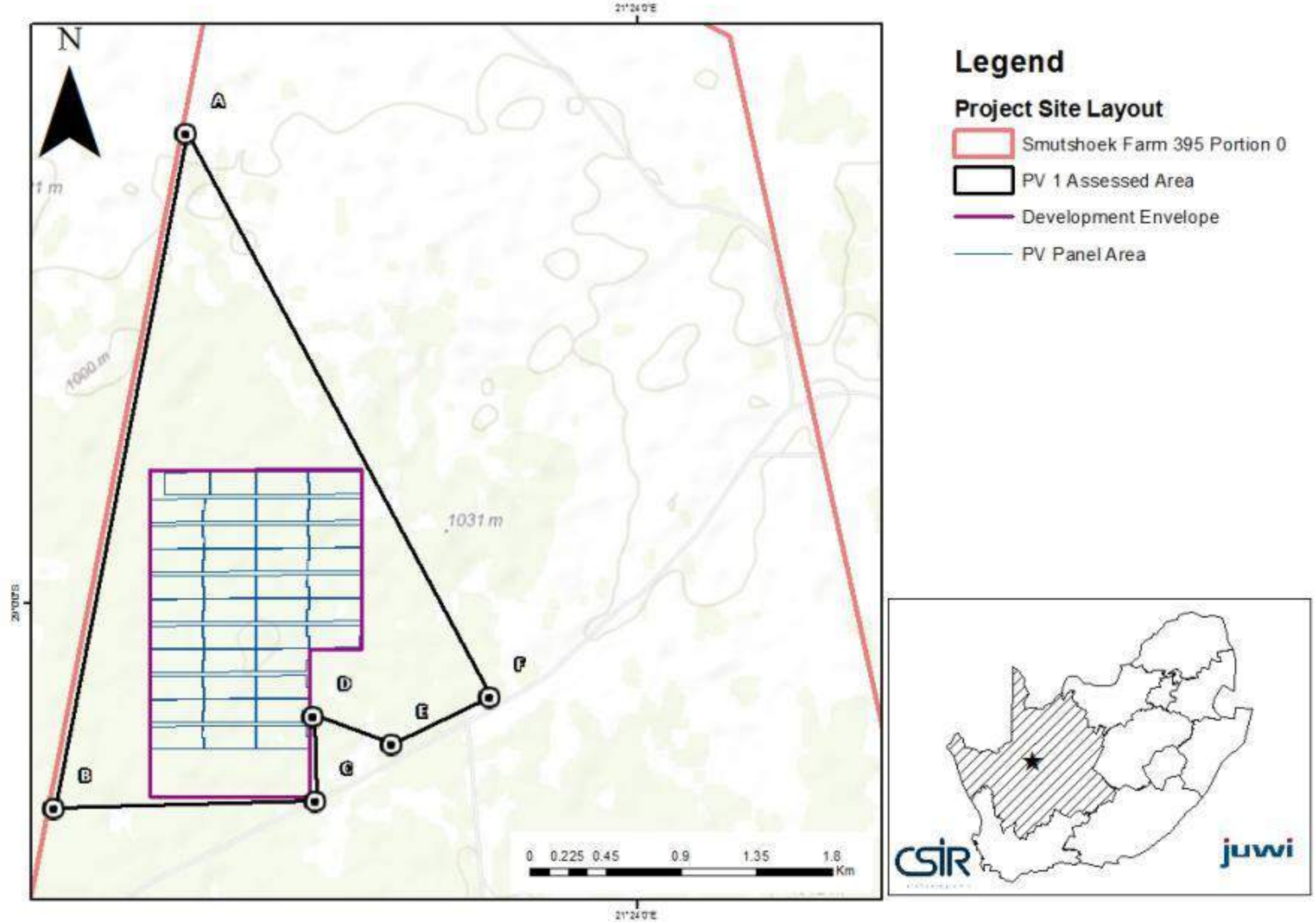

Figure 2-1: Project Areas including corner co-ordinates of the proposed Skeerhok PV 1 (please refer to table 2.1 for the co-ordinates of points A-F)

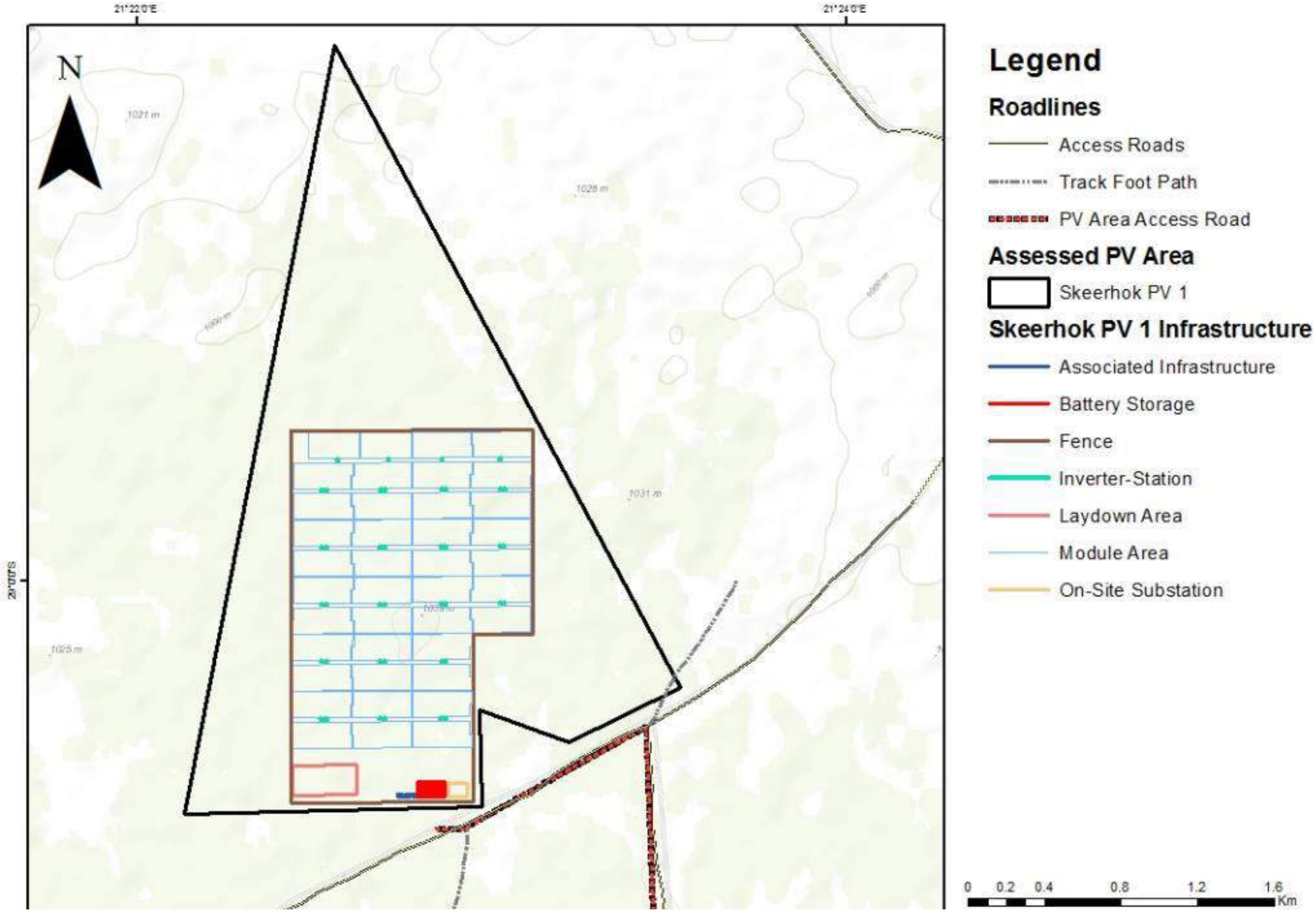

Figure 2-2: Proposed Site Layout of the Skeerhok PV 1 Facility

The total area of Portion 0 of Smutshoek Farm 395, where the proposed SEF will be constructed, is approximately 4,500 ha, while the development area (area under consideration for this assessment) of the SEF is approximately 300 ha, accounting for 7 % of the total area of the farm.

The two main components of the project will consist of the solar field (solar panels and building infrastructure) and the associated infrastructure. The technical components forming part of the Solar Facility are discussed in detail in Sections 2.2 and 2.3 below.

Table 2-2: Summary of technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	Approximately 5 m high
Area of PV Array	≤250 hectares
Number of inverters required	To be determined at detailed design phase based on the invertor sizes available at the time of construction.
Area occupied by inverter/ transformer stations/ substations	To be determined at detailed design phase based on the sizes of the invertor and transformer stations available at the time of construction. This area is however incorporated into the PV array area of ≤250 hectares as indicated above.
Capacity of on-site substation	22/33 kV to 132 kV
Area occupied by both permanent and construction laydown areas	≤1 ha permanent and ≤10 ha temporary is
Area occupied by buildings	≤1 ha area for site office, and Operations and Maintenance (O&M) buildings.
Length of internal roads	≤ 15 km
Width of internal roads	≤ 8 m
Proximity to grid connection	Approximately 30 km
Height of fencing	3 m high
Type of fencing	To be determined at construction phase based on the outcomes of the EPC procurement process.

The 100MWac Solar Facility on Portion 0 of Smutshoek Farm 395 will consist of the following components:

- ***Solar Field:***
  - ≤250 ha of photovoltaic (PV) modules mounted on free field single-axis trackers or fixed tilt PV solar module mounting structures comprised of galvanised steel and aluminium; and
  - below ground electrical cables connecting the PV arrays to the inverter stations, O&M building and collector substation; and
  - Ring main units; and
  - Inverters and mini-subs.

- ***Collector substation:***
  - ≤1 ha 22/33 kV to 132 kV collector substation to receive, convert and step up electricity from the PV facility to the 132 kV grid suitable supply. The facility will house control rooms and grid control yards for both Eskom and the Independent Power Producer. A 32 m telecommunications tower (lattice or monopole type) will be established in the substation area;

- ***O&M area:***
  - Operations and Maintenance (O&M) buildings;
  - ≤1 ha O&M laydown area (near / adjacent substation);

- ≤0.01 ha solar measuring station;
- Parking, reception area, offices, guest accommodations and ablution facilities for operational staff, security and visitors;
- Workshops, storage areas for materials and spare parts;
- Water storage tanks or lined ponds (~160 kl/day during first 3 months; ~90 kl/day for 21 months during rest of construction period; ~20 kl/day during operation);
- Septic tanks and sewer lines to service ablution facilities; and
- Central Waste collection and storage area.

▪ ***Battery Storage System:***
- 100 MWh Battery Storage Facility with a maximum height of 8m and associated operational, safety and control infrastructure;

▪ ***Access road:***
- ≤ 15 km long, ≤ 8 m wide gravel access road running from the Transnet Service Road to the site

▪ ***Service roads:***
- ≤10 km of ≤ 8 m wide gravel internal service roads within the plant boundary;

▪ ***Other infrastructure:***
- Perimeter fencing and internal security fencing and gates as required.
- Access control gate and guard house on access road;
- ≤3.5 km length of water supply pipeline connecting existing boreholes to storage, alternatively water will supplied by the local municipality.
- Stormwater drainage

▪ ***Construction site office area (used during construction and rehabilitated thereafter):***
- ≤1 ha site office area;
- ≤ 10 ha laydown area; and
- ≤1 ha concrete batching plant

The Skeerhok PV 1 project will connect to the Eskom Nieuwehoop Substation located on Portion 3 of Gemsbok Bult Farm 120 via a 132 kV overhead transmission line (the development of the 132 kV line will be considered under a separate Basic Assessment process).

2.2. Solar Field

The Solar Field will consist of the solar arrays and building infrastructure.

▪ ***Solar Arrays***

The footprint of the proposed SEF is estimated to be approximately 300 ha and will include the development of the solar field including electrical infrastructure, the structure of the solar array and foundations. The exact number of solar panel arrays, confirmation of the foundation type and detailed design will follow as the development progresses but a preliminary site layout plan has been included in Chapter 7 and Appendix O of this EIA Report. The PV array is estimated to cover less than 250ha.

▪ ***PV Modules***

The smallest unit of a PV installation is a cell. A number of cells form a module, and finally a number of modules form the arrays (Figure 2-3).

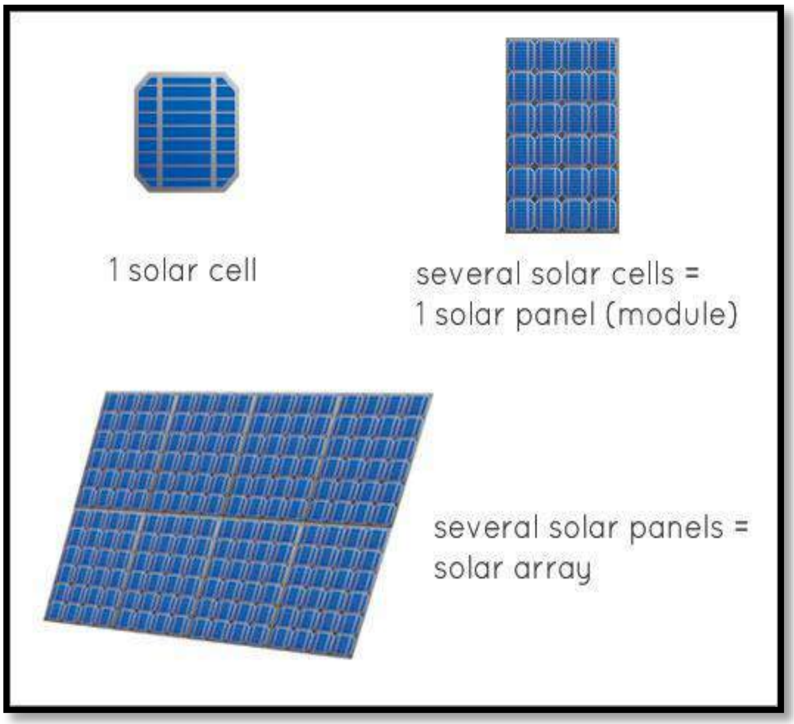

Figure 2-3: Components of the Proposed PV Installation (Source: Go Greena, 2013)

Modules are arranged into strings that form the solar field. Modules are arranged in sections called tables and are installed on racks which are made of aluminium or galvanised steel. The arrays and racks will be mounted above the ground through either steel or concrete towers (which will be confirmed during the detailed engineering phase), as shown in Figure 2-4. The entire structure is expected to be approximately 5 m in height (measured from the ground).

All the arrays will be wired to inverter stations that convert the DC power into AC power.

Figure 2-4: PV Technology

In terms of the composition of PV panels, the glass used to manufacture solar PV technology is designed to maximise absorption of light and minimise reflection, glint and glare (Spaven Consulting, 2011; BRE, 2013). No known adverse effects associated with the possible reflection and glare from solar PV panels on livestock have been flagged in solar PV planning research.

Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The three main mounting systems considered as part of the EIA are:

- Single axis tracking systems;
- Dual axis tracking systems; and
- Fixed tilt mounting structures.

In a fixed tilt mounting structure, the PV panels are installed at a set tilt facing north and cannot move, whereas in a single axis tracking system the panels follow the sun (i.e. east to west) to ensure increased exposure to sunlight, this functionality comes at a higher monetary cost to that of fixed tilt. In a dual axis tracking system, the PV panels can follow the sun from east to west, as well as follow the suns altitude (which results in an optimal angle of radiation onto the panel (Vermaak, 2014)). Dual axis tracking systems can therefore follow the sun throughout the day both horizontally and vertically, however this functionality comes at even higher monetary cost. The type of mounting system will be confirmed during the detailed engineering phase.

- ***Building Infrastructure***

The solar field will require on-site buildings, including operations and maintenance on-site substation and substation building, laydown areas and security enclosures. The on-site substation is expected to extend approximately 32 m in height, with a maximum footprint of 100 m x 100 m (≤1 ha). Ablution facilities are likely to be incorporated into the office structures occupying an area of roughly 30 m x 30 m. The buildings will likely be of single storey design. The buildings are required to support the functioning of the facility and to provide services to personnel that will operate and maintain the facility. The building infrastructure for both technology types will be the same. Detailed design will follow as the development progresses.

2.3. Associated Infrastructure

- ***Electrical Infrastructure***

As mentioned above, the solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert DC current to AC current. The strings will be connected to the inverter stations by low voltage underground (internal) DC cables. Power from the inverter stations will be transformed from low to medium voltage (22/33kV) at the medium voltage transformers. From here the energy passes to the ring main units which are connected in series to the proposed on-site substation, via medium voltage underground cables (22/33 kV). The voltage is again stepped up to 132kV at the onsite sub and the power produced transmitted via a 132 kV overhead transmission line into the national grid system at the Eskom Nieuwehoop substation on Portion 3 of Gemsbok Bult Farm 120. An overhead 132 kV transmission line will be constructed for the SEF and will extend between the proposed on-site substation and the Eskom Nieuwehoop Substation. It will be constructed with steel or concrete tower structures. The length of the proposed overhead line, connecting the on-site substation to the Nieuwehoop Substation is approximately 27 km.

It is quite possible that the project owner will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which includes the 132 kV transmission line and additional feeder bay(s), busbar(s), 400/132 kV transformer and a transformer bay at the Eskom Nieuwehoop Substation). Following

the construction phase, the proposed electrical infrastructure will either be transferred into the ownership of Eskom or remain in the ownership of the proponent.
Please note that the construction of the 132 kV transmission line, service road below transmission line, the feeder bays, busbars, 400/132 kV transformer and transformer bay at the Eskom Substation will be subject to a separate BA process and will not be considered as part of this EIA process.

Detailed design will follow as the development progresses.

- ***Roads***

The main access road will be the National Road, the R27, and an existing Transnet Service Road leading to the site. The R27 extends from Keimoes, which is the most northern point of the road, to Vredendal in the south. The R27 is 6 m wide and falls within a 45 m road reserve. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The Transnet Service Road is 7-8 m wide. It is proposed that an internal gravel access road be constructed from this Transnet Service Road to the proposed site. This road is not expected to be more than 8 m wide. The length of the internal roads will be confirmed as the location, design and layout of the facility progresses. Discussions have been initiated and held with Transnet and the Project Applicant during the Scoping and EIA Process regarding the potential use of the Transnet Road and any specific associated requirements.

In terms of traffic generation, a Traffic Impact Statement has been included in Appendix N of this EIA Report.

The types of materials that will need to be transported to site during the construction phase include the following:

- Transformers;
- PV Modules;
- Converter components;
- Steel and Aluminium for Racking;
- Switchgear and equipment;
- Cables;
- Gravel and sand;
- Concrete;
- Water;
- Reinforcement; and
- Other material.

During the operational phase, far fewer materials will need to be transported to site. Trips will also be generated for the transportation of staff during the construction and operational phases. A description of the vehicle trips are provided in Appendix N of this EIA Report.

- ***Fencing***

For various reasons (such as security, public protection and lawful requirements), the proposed facility will be secured via the installation of boundary fencing. The fencing is planned to be approximately 3 m high. Access points will be managed and monitored by an appointed security service provider. The type of fencing is yet to be determined; however it may be a fully electrified option. Detailed design will follow as the development progresses.

- ***Panel Maintenance and Cleaning***

The accumulation of dust on solar panels negatively influences the productivity of the solar facility, as such the panels generally require regular cleaning. Cleaning and maintenance of the panels will require water.

It is proposed that panel cleaning will take place quarterly; however this may be revised should the site conditions warrant more frequent cleaning. Should municipal water be delivered to site it will be stored on site in suitable containers during the operational phase. It is estimated that 7000 kilolitres of water will be used annually for the cleaning of the solar panels, road maintenance and general employee usage during the operational phase (the project has a minimum lifespan of 20 years). It is estimated that during the first 3 months of construction approximately 160 kL/day predominantly for road construction. For the remaining 21 months of construction approximately 90 kL/day.

- ***Stormwater drainage***

Although care has been taken to avoid drainage areas, if required, stormwater infrastructure will be constructed on the site to ensure that stormwater run-off from the site is appropriately managed. This run-off water will not contain any chemicals or hazardous substances, and will be released into the surrounding environment, via the stormwater infrastructure, at suitably selected natural drainage points.

- ***Batching plant***

A concrete batching plant is proposed as part of the Construction Site office area, with a footprint of approximately 1 ha.

- ***Battery storage facility***

It is proposed that a nominal 100 MWh battery storage facility for grid storage would be housed in containers, or enclosed within a building, with a maximum height of 8m and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. Currently, the Lithium-ion is the preferred battery technology for this facility, with the option to change to another of the battery technologies included above.

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the completely dispatchable power generation market competing directly with typically fossil fuel sources of power generation, thereby providing a truly sustainable electricity supply option.

Note: Please see Appendix O, Section 8 for a description of the mitigation and management measures relating to battery storage.

2.4. Overview of Project Development Cycle

2.4.1. Construction Phase

The construction phase will take place subsequent to the issuing of a positive EA from the DEA and once a power purchase agreement (PPA) with a suitable energy off-taker is signed, this could be Government or private. The construction phase is expected to be approximately 12 - 24 months for the proposed Solar PV Facility.

The construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the site (the personnel that will not be accommodated on-site). In terms of site establishment, laydown areas will be required at the outset of the construction phase, as well as dedicated access routes from the laydown areas to the working areas. Haul roads for construction traffic (for the delivery of concrete, road materials and other construction materials) will be required, as described in Section 2.3 above.

The laydown area will be located within the assessed area. It is expected that the laydown area will be temporary in nature (for the duration of the construction phase) and will include the establishment of the construction site camp (including site offices and other temporary facility for the appointed Contractors). The laydown area is expected to cover a maximum area of 10 ha, the area will thereafter be rehabilitated (i.e. returned to its pre-construction condition) at the end of the construction phase.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the Environmental Management Programme (EMPr), which will be compiled during the EIA Phase and included in the EIA Report. During the construction phase, both skilled and unskilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however approximately 600 direct and 1000 indirect employment opportunities are expected to be created during the construction phase. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.

The main activities that will form part of the construction phase are:

- Removal of trees and large bushes and ground-vegetation clearance for buildings and substations;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Construction of internal access roads where required;
- Stockpiling of topsoil and cleared vegetation;
- Transportation of material and equipment to site; and
- Construction of the solar field (consisting of the solar arrays and buildings) and additional infrastructure.

2.4.2. Operational Phase

The following activities will occur during the operational phase:

- Generation of 100 MWac of electricity to add to the national grid;
- Storage of 100 MWh of energy; and
- Maintenance of the SEF, including washing of panels (as explained in Section 2.3).

The projected operations are expected to provide several services and added economic spin offs (as highlighted in Chapter 1 of this EIA Report). The proposed SEF is expected to generate electricity for a minimum period of between 10 and 20 years. The operational phase of the project is expected to create skilled employment opportunities. However, other opportunities may arise for unskilled labour to be integrated to the ancillary activities. During the operational phase, approximately 50 direct and 150 indirect opportunities will be created over the 20 year lifespan of the proposed facility.

2.4.3. Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition.

Should the unlikely need for decommissioning arise (i.e. if the SEF becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and any legislation or guidelines relevant at the time and the site will be rehabilitated and returned to the pre-construction state.

If the site is not decommissioned, it is possible that a lease extension could be granted based on agreements with the landowner, as well as a renewed PPA. If this occurs, the site and technologies could possibly be advanced and upgraded, subject to the legislative requirements at that point in time.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 3:

Description of the Affected Environment

CONTENTS

TABLES

FIGURES

CHAPTER 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter of the EIA Report provides an overview of the affected environment for the proposed Skeerhok PV 1 project and the surrounding region. The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development.

This information is provided to identify the potential issues and impacts of the proposed project on the environment. The information presented here has been sourced from:

- Preliminary scoping input from the specialists that form part of the project team;
- Inputs from the Scoping and EIA Reports of the proposed Mulilo Renewable Project Development's Nieuwehoop Phase 1 and Phase 2 Solar PV projects proposed adjacent to the proposed Skeerhok PV 1 project (this project);
- Review of information available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and
- !Kheis Local Municipality and ZF Mgcawu District Municipality IDPs and the Northern Cape PSDF.

It is important to note that this chapter intends to provide an overview and does not represent a detailed environmental study. Detailed descriptions of the proposed project site (Skeerhok PV 1) focused on significant environmental aspects of this project are provided in the relevant specialist studies (which are included in Appendix I to N of this EIA Report).

3.1. Background

The proposed project is located on Portion 0 of the Farm Smutshoek 395 near Kenhardt in the Northern Cape Province. The total farm property is approximately 4500 ha in size and the development footprint is 300 ha for Skeerhok PV 1. As previously noted, the site is located approximately 43 km north-east of Kenhardt, in the ZF Mgcawu District Municipality and the !Kheis Local Municipality in the Northern Cape Province. The co-ordinates of the corner points of the preferred project area are provided in Chapter 2 of this EIA Report. Figure 3.1 provides a locality map of the proposed project area within a regional setting.

3.2. Preliminary Sensitivity Screening

Based on the preliminary sensitivity screening undertaken for the site, the proposed project area does not fall within any threatened ecosystem, National Protected Areas, National Protected Area Expansion Strategy (NPAES) Focus Areas or areas of conservation planning. The proposed SEF falls within the *Bushmanland Arid Grassland* veld type (NKb3), which is an extensive habitat form, located primarily to the south of the Orange River, but may include a number of smaller habitat forms within its broader extent. This type of vegetation is classified as *Least threatened* (i.e. this vegetation type is not listed as Threatened Ecosystems under the National Environmental Biodiversity Act (NEMBA)). In terms of the National Biodiversity Assessment (NBA) (2011), rivers are classified into critically endangered, endangered, vulnerable and least threatened. Two drainage features flow in close proximity to the farms of the proposed SEF, one of these is the *NRougas se Loop* flowing towards the Smutshoek Farm 395 and an unnamed drainage feature running towards Portion 9 of Gemsbok Bult Farm 120. These features are classified as Class B (Largely Natural) National Freshwater Ecosystems Protected Areas (NFEPA) (Figure

3.9). These features have also been identified as Ecological Support Areas in terms of the SANBI Conservation Plan for the Northern Cape.

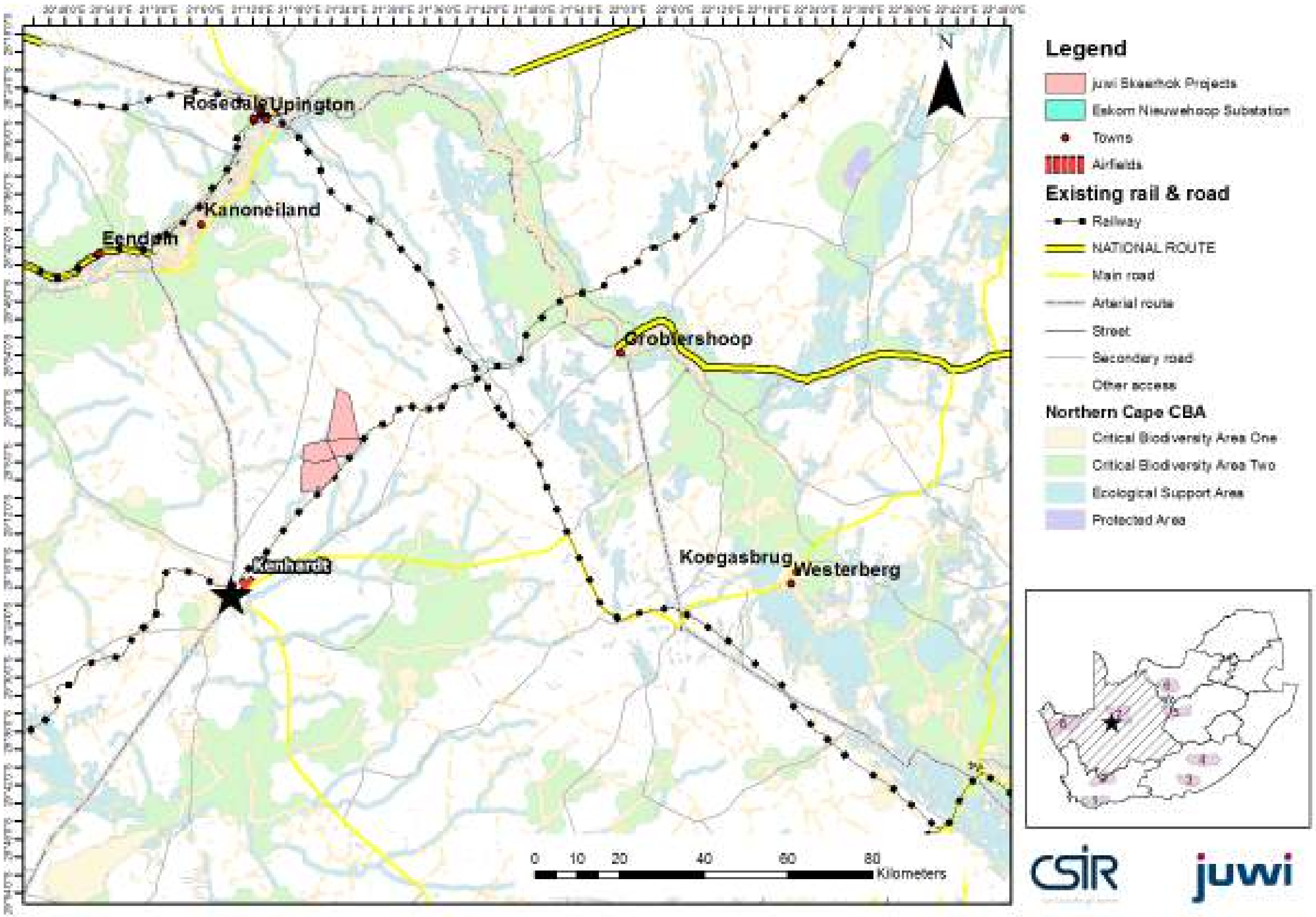

Figure 3.1: Locality Map for the proposed Skeerhok PV 1 Project within a regional setting

3.3. Biophysical Environment

3.3.1. Climatic Conditions

The mean annual rainfall of South Africa is shown in Figure 3.2 below. The climate of the Northern Cape is semi-arid with a late summer-autumn rainfall regime. Average rainfall of the area varies from 50 mm to 400 mm per year. Evaporation levels within this province exceed the annual rainfall. Climate conditions are extreme (i.e. very cold in winter and extremely hot in summer).

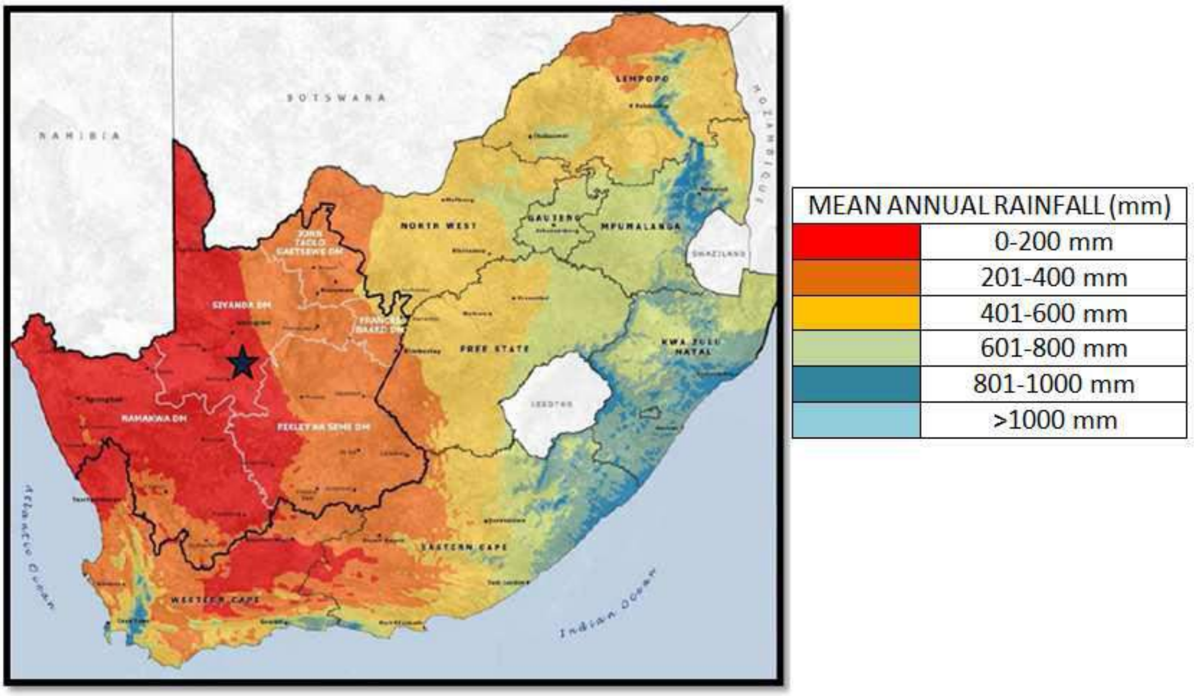

Figure 3.2: Mean Annual Rainfall Levels of South Africa (Source: Northern Cape PSDF, 2012)

Figure 3.3 shows the average rainfall and rainy days in Kenhardt for 2016, and Figure 3.4 shows the average rainfall and evaporation for Kenhardt in 2015. The lowest rainfall occurrence was in Julye (0.1 mm) and the highest rainfall occurrence was in January 2017 (59.8 mm). The area receives most of its rainfall during autumn (March to May), with a semi-arid to arid climate. The relevance of this information is that rainfall occurs whilst temperatures are still quite high and therefore the associated evaporation rates will be high. This implies that groundwater recharge will need to be assessed prior to construction.

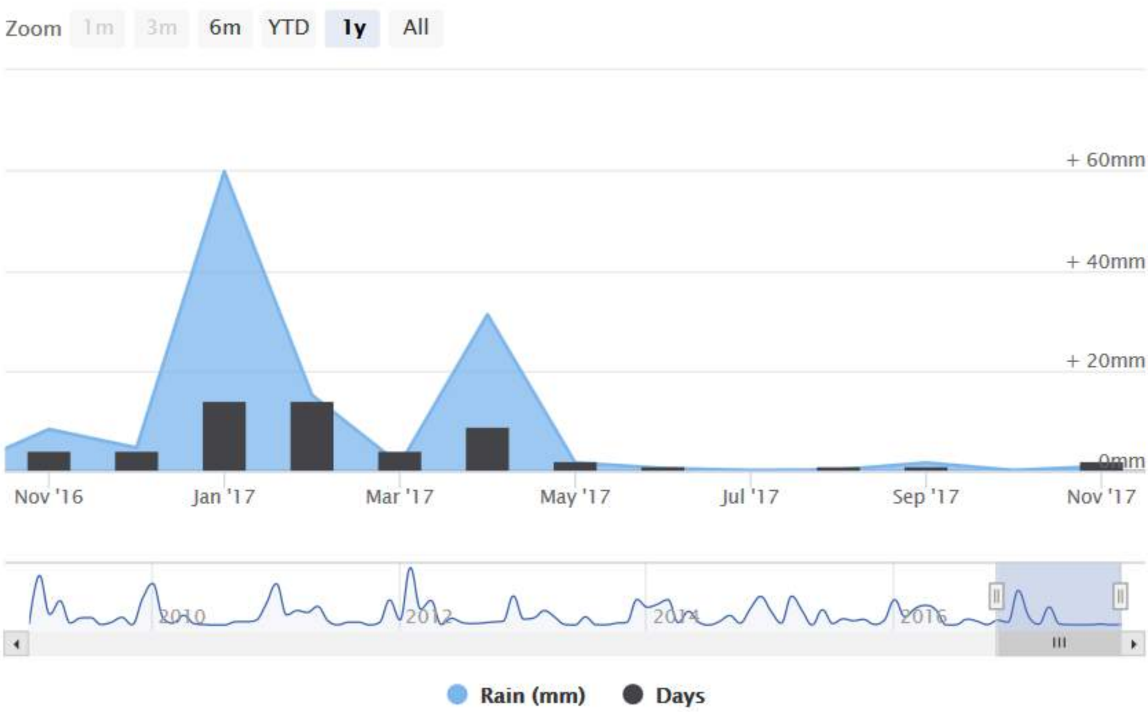

Figure 3.3: Mean Rainfall Levels and Rainy Days for Kenhardt in 2016 (Source: WeatherOnline.com)

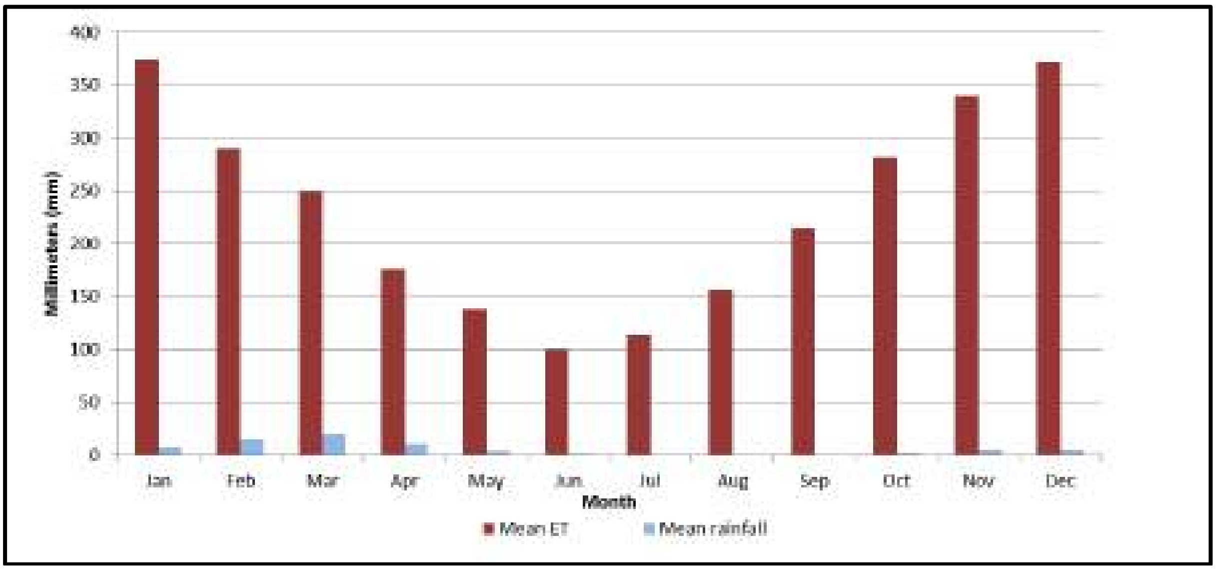

Figure 3.4: Long Term Average Rainfall and Evaporation (Schulze *et al*., 2008 in GEOSS, 2015)

Figure 3.5 shows the average monthly climatic chart for Kenhardt[1]. As shown in Figure 3.5, the highest temperatures are reached in the summer months (December to January) and the lowest in the winter months (June to August). The average temperature of the area is 19.6˚C, with an annual average high

[1] Data available online at: http://www.climatedata.eu

temperature of 28˚C and an annual average low temperature of 11˚C. The average midday temperatures for Upington range from 19°C in June to 33°C in January (GEOSS, 2015).
The average daily solar radiation levels in South Africa range between 4.5 and 6.5 kilowatt-hour per square meter (kWh/m²). In South Africa the measured solar radiation is the highest in the Northern Cape, North West Province and the Free State. As discussed in Chapter 2 and Chapter 5 of this EIA Report and shown in Figure 5.4, the site was selected because of the high solar radiation levels of the area (2300 kWh/m² per annum or 6.3 kWh/m² per day).

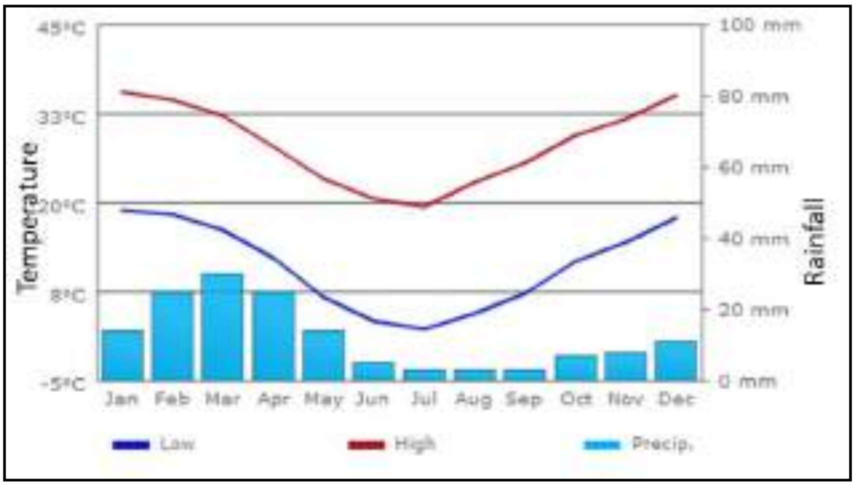

Figure 3.5: Climate chart for Kenhardt showing the monthly maximum and minimum temperatures (lines) and the average rainfall (bars) (Source: Climatedata)

One of the most important climate parameters for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into 6 categories across the country (as shown in Table 3.1). The proposed development site falls within class 6 which is described as a very severe limitation to agriculture (Lanz, 2015).

Table 3.1: The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, Undated)

Climate class	Moisture availability (Rainfall/0.25 PET)	Description of agricultural limitation
C1	>34	None to slight
C2	27-34	Slight
C3	19-26	Moderate
C4	12-18	Moderate to severe
C5	6-12	Severe
C6	<6	Very severe

3.3.2. Topography and Landscape

The topography of the region is flat with gentle, open undulations (Holland, 2015). The underlying geology of the sites belongs to the Vyfbeker Metamorphic Suite and represents supracrustal rocks (sediments which have undergone several episodes of metamorphism and deformation) of the Kakamas Terrane (Johnson, Anhaeusser, and Thomas 2006). Erosion resistant rocks of this suite form distinctive low rocky hills that are often visible in the distance, although none occur in the study area. Vegetation consists of low shrubs and grassland with occasional quiver trees (kokerboom), and produces a mottled background to most views which is effective at making some development types such as power lines and pylons blend in with the background (Holland, 2015).

The Kenhardt landscape is arid with brown sand occurring widely and being occasionally interspersed with black boulders. Because of the lack of trees in the area, a large number of weaver birds make use of the telegraph poles along the road to build their community nests (GEOSS, 2015).This was also evident during the avifaunal specialist's site visit conducted as part of the scoping phase assessment; where a Martial Eagle was spotted sitting on top of a Sociable Weaver's nest on a Telkom pole (Wildskies, 2017).

The elevation characteristics of the project area are very slight with an average of slope of 0.5 %, an elevation gain of approximately 27 m on the north-east profile (across 14 km) and 31 m on the east-west profile (across 6 km) (Figure 3.6) (Google Inc., 2015).

A description of the geology and vegetation of the region is provided in their respective sections of this chapter.

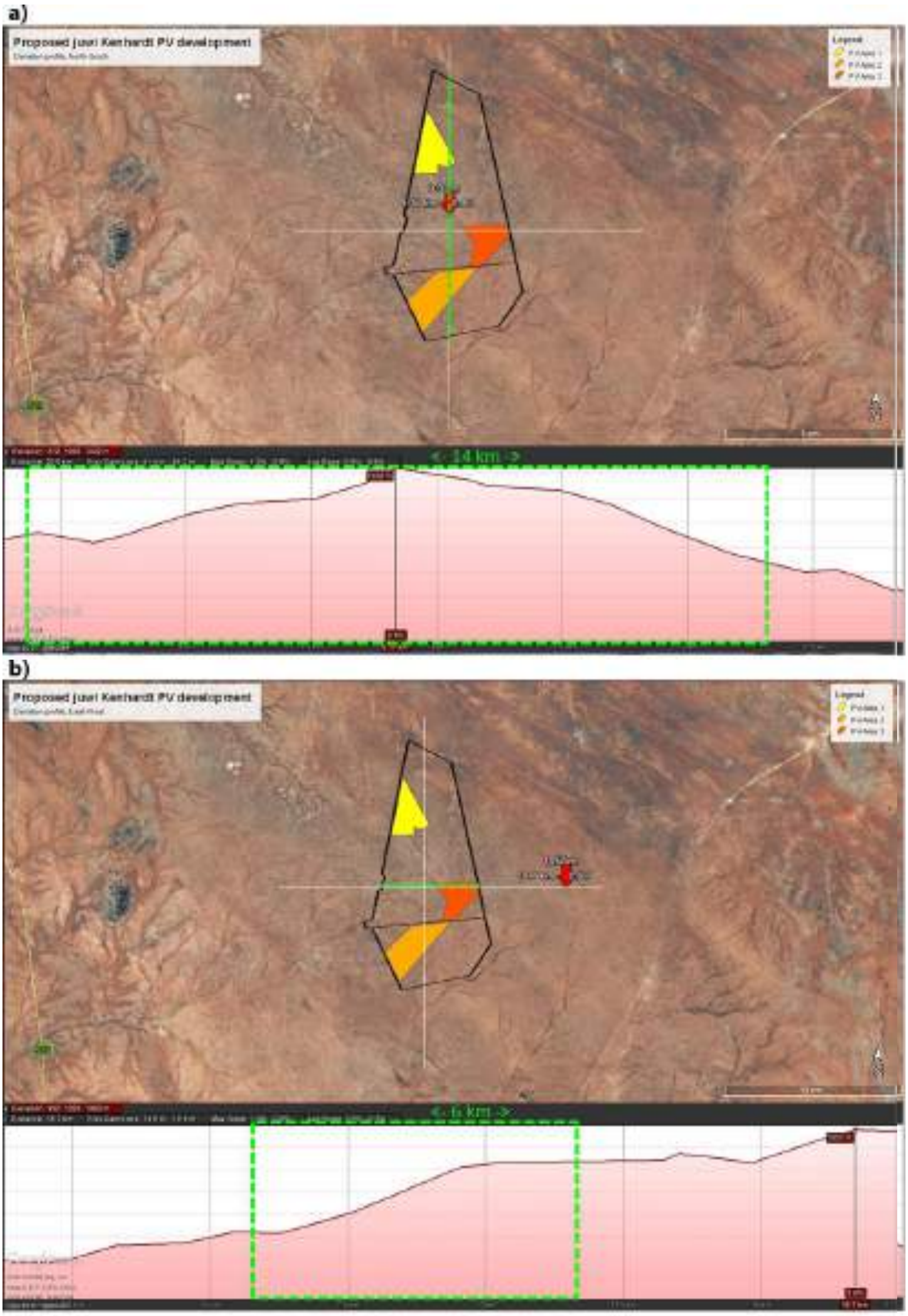

Figure 3.6: The project area is in a semi-desert steppe characterised by slight slope. The green dotted lines indicate the position of the project area in the landscape. There is an elevation gain of approximately 27 m on the north-east profile (a) and approximately 31 m on the east-west profile (b) (Google Inc., 2015).

3.3.3. Regional Geology

The Geological Survey of South Africa (now the Council for Geoscience) has mapped the area at 1:250 000 scale (2920 - Kenhardt). The geological features associated with the proposed PV site, as well as that of the additional affected farm portions are shown in Figure 3.7 below. The Skeerhok PV 1 Facility is situated on Friesdale Charnockite (Mf) granite outcrops. This formation is part of the Keimoes Group.

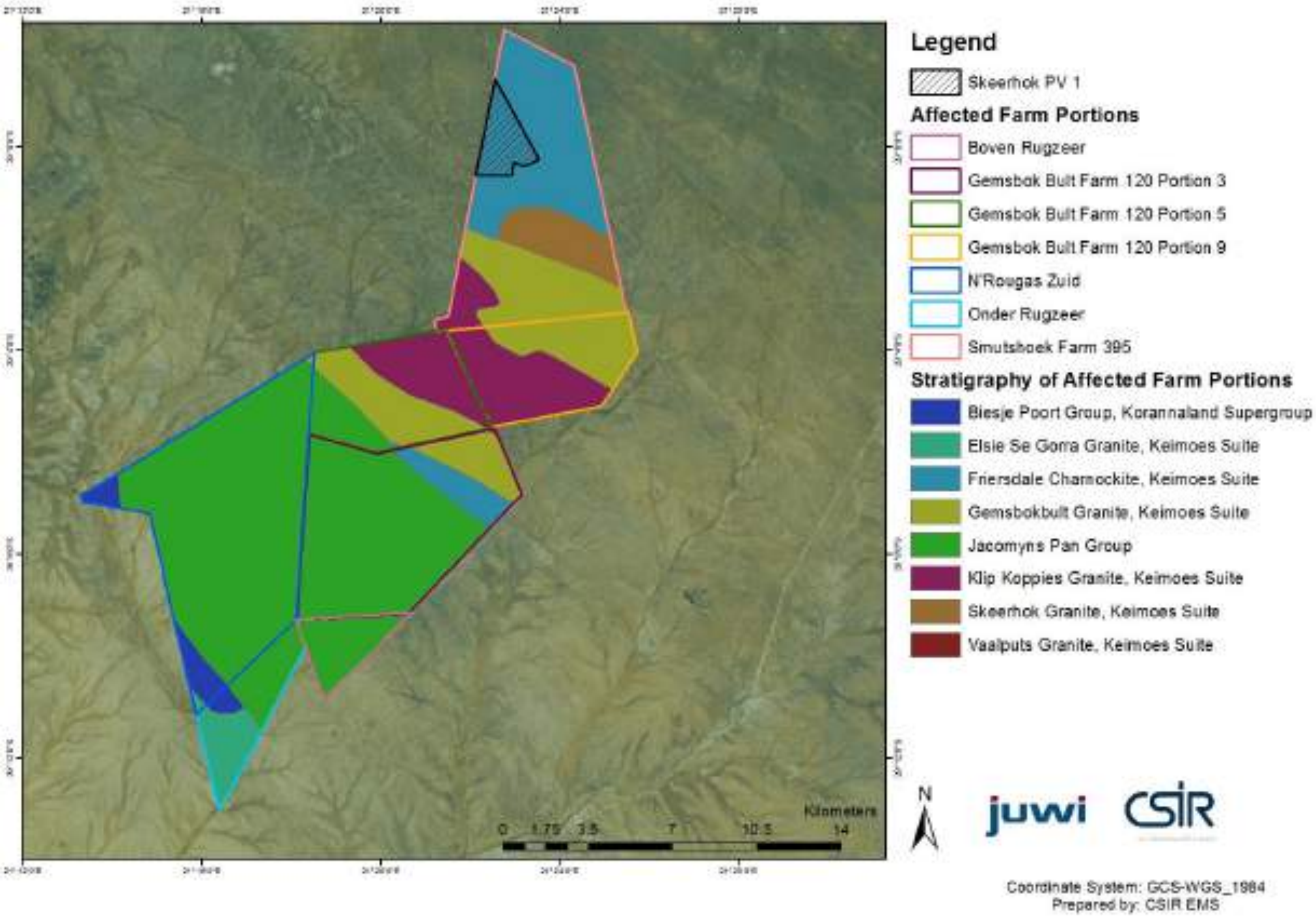

Figure 3.7: Geological setting of the PV areas, and that of the additional affected farms.

3.3.4. Soil Types and Soil Potential

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The proposed project is located across two very similar land types, Ag6 and Ag5.These land types comprise predominantly shallow, red, sands to loamy sands on underlying rock, hard-pan carbonate, or hard-pan dorbank. The soils fall into the arid Silicic, Calcic, and Lithic soil groups according to the classification of Fey (2010). A summary detailing soil data for the land type is provided in Table 3.2. The land has a low to moderate water erosion hazard, mainly due to the low slope, but it is susceptible to wind erosion because of the sandy texture of the soil (Lanz, 2015).

Table 3.2: Land Type Soil Data for the Site

Land type	Land capability class	Soil series (forms)	Depth (cm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Ag6	7	Hutton Mispah Hutton Hutton Rock outcrop	10-35 5-15 45->120 10-35 0	6-12 5-12 6-12 10-20	7-15 7-15 15-25	ca, so, db R ca, so, R ca, so, db R	43 14 10 9 8
Ag5	7	Hutton Mispah Mispah Hutton Hutton Rock outcrop	10-35 5-15 5-15 45->120 10-35 0	5-12 4-12 4-12 6-12 10-20	6-15 7-15 15-25	ca, so, db R ca ca, so, R ca, so, db R	43 14 12 10 9 8

Land capability classes: 7 = non-arable, low potential grazing land.
Depth limiting layers: R = hard rock; so = partially weathered bedrock; ca = hardpan carbonate; db = dorbank hardpan.

3.3.5. Agricultural Capability and Sensitivity

Land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the eight category scale, of Class 7 - non-arable, low potential grazing land. The limitations to agriculture are aridity and lack of access to water plus the shallow soil depth and rockiness. Because of these constraints, agricultural land use is restricted to low intensity grazing only. The natural grazing capacity is low, at mostly 31-40 hectares per animal unit. The current farmer uses an average stocking rate of 10 hectares per sheep (Lanz, 2017).

3.3.6. Regional Hydrogeology

According to the 1:500 000 scale groundwater map of Prieska (2920) the entire study area hosts an intergranular and fractured aquifer (i.e. the wind-blown sands and river alluvium as well as fractures within the bedrock constitutes an aquifer) with an average borehole yield of 0.1 ℓ/s to 0.5 ℓ/s (GEOSS, 2014).

With such low rainfall in the area, and thus associated low groundwater recharge conditions, it is anticipated that the groundwater quality will be poor. The area is characterised as having low borehole yields, determined from the boreholes that are in close proximity to the proposed site. The option to make use of borehole water for the proposed Skeerhok PV 1 project will need to be verified before being ruled out as an option.

3.3.7. Ecology: Aquatic and Terrestrial Environment

The ecological evaluation is based on desktop evaluations of the site and general area, as well as on site evaluations of the study area by the Ecology Specialist. The SANBI BGIS was used to define the regional vegetation and water resources present in the area and the anticipated ecological sensitivity of the receiving environment. In addition, a literature review of existing reports, scientific studies, databases, reference works, guidelines and legislation relevant to the study area was conducted to establish the baseline ecological and vegetative condition of the site and associated environment. The specialist undertook a biophysical evaluation of the land upon which the project is proposed to be established during the period June to November 2017 and entailed both a literature review of the region, as well as on site evaluations, during which specific primary data was collected and evaluated. In addition, the identification of key ecological features on and adjacent to the site was undertaken allowing for the interpretation of the prevailing habitat form and associated processes

3.3.8. Hyrdology and Aquatic Environment (Surface Water, Drainage, and Wetland Ecosystems)

The Northern Cape is divided into the following four Water Management Areas:

- Lower Orange;
- Upper Orange;
- Olifants/Doorn; and
- Lower Vaal.

The proposed project lies within a xeric to semi xeric environment with rainfall confined to a short period during the summer/autumn months. The prevailing climate regime indicates that rainfall is generally sparse, and together with the sandy percolative soils that prevail across the region there is limited potential for extensive wetland and riparian features.

The National Freshwater Ecosystem Priority Areas (NFEPA) project earmarked several important catchments (sub-quaternaries) based either on the presence of important biota (e.g. rare or endemic fish species) or the degree or lack thereof with regard to riverine degradation, i.e. the greater the catchment degradation the lower the priority to conserve the catchment. The important catchments areas are then classified as Freshwater Ecosystem Priority Areas (FEPAs). No FEPAs are located within the study area or immediately downstream of the study area (SDP, 2015).

Figure 3.8 indicates the site in relation to drainage quaternaries within the region. The project area is seen to traverse three specific catchments, these being the D53B and D53C and to the north, the D73F. Primarily the subject site is drained to the north through a series of dendritic features that eventually feed directly in the Orange River at the Kakamas to Upington stretch of this system. A component of the site may also serve the Hartebees River (D53C) which also eventually drains into the Orange River (Figure 3.8) (SDP, 2017).

Figure 3.8: Proposed project area and relation to drainage quaternaries within the region (SDP, 2017)

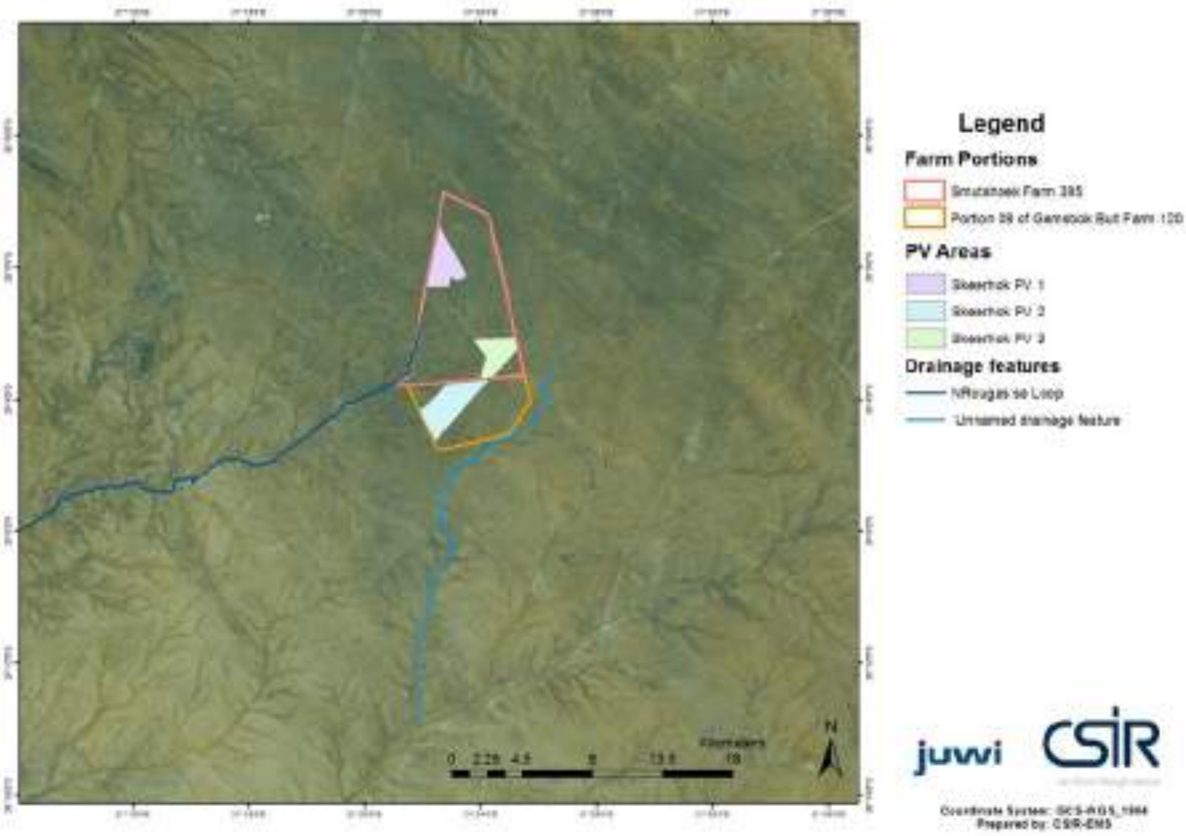

Figure 3.9: Proposed project area in relation to the major drainage features in the region.

The primary drainage features serving the proposed Skeerhok PV 1 site are the NRougas se Loop and an unnamed drainage feature (Figure 3.9), typically common hydro geomorphological features that are served by a number of small dendritic features. These drainage features are subject to intermittent flow and are indicated primarily by evidence of flow or deposition of materials (Brinson et al., 1993; USDA 2008). As such, it will be important to identify these features within the subject sites through the identification of a combination of factors, namely verdant vegetative growth and the presence of hydrogeomorphic features. Notably, there is an absence of distinct riparian and geohydromorphic soil indicators that are indicative of wetland and river habitats and it is common for extraneous factors, such as the regular passage of livestock, to drive the formation of these dendritic drainage features on sites. The absence of these indicators is due primarily to the fluctuating levels of inundation in these drainage features, over extended periods of time which is also driven by the intensity and erratic rainfall experienced in this region. Farmers in the region note that these features show short term inundation with water during high rainfall periods, in events that arise “every 4 to 5 years” (S Strauss pers. comm.) (SDP, 2017).

Although ephemeral in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can in some instances, be considered groundwater “recharge zones” in respect of the local sub surface hydrology. From a biotic perspective, the drainage lines do serve as seasonally important refugia and congregation points for inter alia invertebrates (e.g. Order Odonata) and vertebrates (e.g. Order Anura) (SDP, 2017).

3.4. Terrestrial Environment

3.4.1. General Vegetation Description

The proposed site is located within the Nama-Karoo biome of South Africa and as noted previously, the site falls within the Bushmanland Arid Grassland (Nkb3) (Figure 3.10) vegetation type (Mucina and Rutherford 2006). This vegetation unit is the second most extensive vegetation type in South Africa extending from around Aggeneys in the east to Prieska in the west. It is associated with freely draining alkaline soils common to this area. This veld type is an arid grassland form comprising of extensive plains dominated by sparse, intermittent pockets of *Aristida* spp and *Stipagrotis* spp (SDP, 2017).

Although a graminoid dominated region, the vegetation type is considered to contain a number of endemic species including *Larryleachia dinteri*, a small succulent, associated with rocky outcrops and the larger *Aloe dichotoma*, which is a listed protected species in terms of the Northern Cape Conservation Act.

Notably, much of the Kenhardt region has been subject to significant and extensive grazing by livestock, particularly sheep, which has and continues to alter the vegetation structure and form within the region.

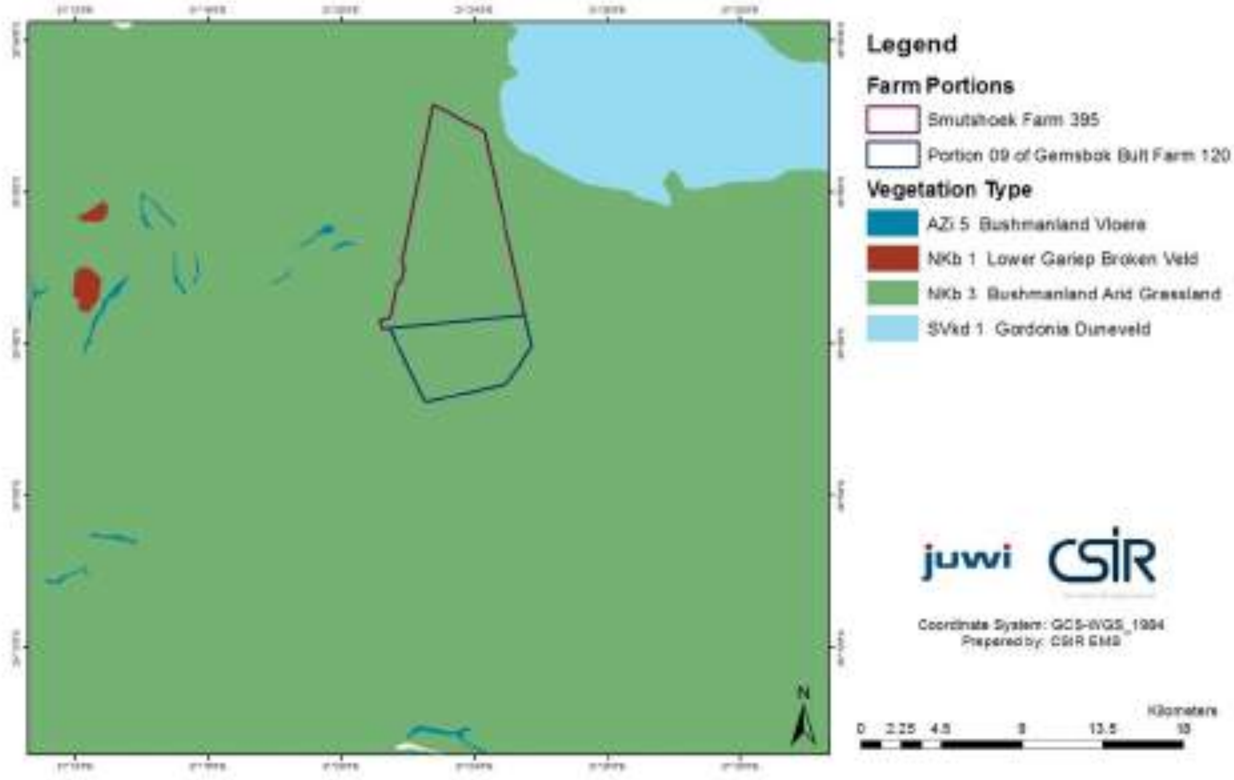

Figure 3.10: Vegetation Map in relation to the proposed project site

Fauna

Fauna that prevail within the subject region are typical of an arid environment. Due to the limited topographic variation in the terrain and the generally unvarying landscape, faunal species are widespread across the region, although the presence of key bio physical factors, including water and the presence of particular plant species may serve to concentrate species at certain localities. It follows from this that the occurrence of faunal species within the subject area is likely to be in respect of these animals either utilizing the subject area as refugia, or as part of a wider foraging range or territory. Typically, many of the mammalian and reptilian species encountered in the region are fossorial and burrowing species. Such species included meerkat (*Suricata suricata*), ground squirrel (*Xerus inauris*) and Aardvark (*Orycteropus afer*). Some larger mammals common within the region include Springbok (*Antidorcas marsupalis*) and Steenbok (*Raphicerus campestris*), which are common in the open habitat (Estes, 1992). A number of the above species may be excluded from the PV site, once operational (in particular larger mammals and some reptiles), while smaller fossorial mammals are likely to integrate with such facilities and may indeed benefit from the presence of areas where grazing is limited and predators are excluded.

Avifauna

This arid area is home to several large terrestrial bird and raptor species, the most important of which are Ludwig's Bustard *Neotis ludwigi*i, Kori Bustard *Ardeotis kori*, Secretarybird *Sagittarius serpentarius*, Karoo Korhaan *Eupodotis vigorsii*, Verreaux's Eagle *Aquila verreauxii* and Martial Eagle *Polemaetus bellicosus*. In addition to being classified as threatened regionally and in some cases globally, most of these species are facing significant threats to their survival from existing impacts in the arid parts of South Africa. This area is home to an assemblage of arid zone adapted smaller bird species including larks, sparrow-larks, chats and others. Most important of these, from a conservation perspective, are Red Lark *Calendulauda burra* and Sclater's Lark *Spizocorys sclateri*, both of which are listed as regionally threatened species (Vulnerable and Near-threatened respectively), have very restricted ranges and have been recorded in the broader area within which the study area is situated. Burchell's Courser (Vulnerable) *Cursorius rufus* also occurs in the broader area (Wildskies, 2017).

It is important to note that the proposed PV site lies distally from the nearest Important Bird and Biodiversity (SDP, 2017; Wildskies, 2017).

Protected Areas
As noted in the Background Section above, the site does not fall within any protected areas defined in the NPAES or South African National Parks (NBA). There are no formal protected areas within 20 km of the proposed site (SDP, 2015). The closest NPAESs are the Gariep NPAES, located 30 km to the south-east of the site and the Kamiesberg Bushmanland Augrabies NPAES located 43 km north-west of the site. The Augrabies Falls National Park is approximately 115 km north-west of the site.

3.4.2. Heritage Profile

In common with much of Bushmanland, the project area is a flat expanse of relatively flat terrain but with many ephemeral drainage lines visible on aerial photography. These drainages affect the various sites and their alternatives to differing degrees. Previous work in the area (Orton 2014a, 2014b, 2014c) suggests that vegetation cover is likely to be very sparse with the ground surface openly visible at all times

In terms of expected heritage resources, Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont, 1995). Such material is referred to as 'background scatter' and is invariably of very limited significance. At times, however, the scatter can become very dense and mitigation work is occasionally called for. The artefacts located in these contexts are largely Early Stone Age (ESA) and Middle Stone Age (MSA) and are not associated with any other archaeological materials – these would have long since decomposed and disappeared. Previous experience immediately east of the present site suggests that such dense accumulations of artefacts are unlikely to occur in this area (ASHA Consulting, 2015).

Of potentially more significance, however, are Later Stone Age (LSA) sites which are located along the margins of water features in Bushmanland. These features include both pans and ephemeral drainage lines. Such sites have been identified in the vicinity of the present study area but generally associated with pans rather than drainages. These sites typically contain mostly stone artefacts, but fragments of ostrich eggshell (used as water containers and also as a food source) are also found at times. Similar LSA sites can also be found in association with rocky outcrops (e.g. Orton 2016c, 2016f). Because of their positions along water courses and adjacent to rocky areas, such sites are often avoided by development proposals because of the need to avoid the relevant natural features.

Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the substantial but non-perennial Hartebeest River close to Kenhardt, where he expected elevated frequencies of archaeological material, revealed virtually nothing. However, the present author has seen low density artefact scatters as well as both geometric painted and representational engraved rock art along the Hartebeest River just to the south of Kenhardt. Earlier work closer to the study area by the present author (Orton 2016c) has also revealed many important archaeological sites along one river some 13 km south of the present study area. These were a suite of LSA and historical artefact scatters with artefacts indicating occupation during the Anglo-Boer War. One painted geometric rock art site has also been found in the area, this time some 6 km south of the present study area (Orton 2016f).

Another kind of Stone Age archaeological site fairly commonly encountered in Bushmanland is small rock outcrops that have been quarried as a source of stone material for making stone tools. Several such occurrences of flaked quartz outcrops in particular have been noted in the general surrounding area.

The built environment is sparsely represented in Bushmanland because the farms tend to be so large. The vast majority of structures appears to be quite recent in age (20th century) and is of very limited heritage significance.

Graves are generally rare, but isolated graves have been reported (e.g. Orton 2016f, 2016h). Some farms may have small graveyards located close to their farm buildings. Just one has been seen by the present author while working in the general area and this is on the farm immediately to the south of the present study area. Unmarked pre-colonial graves can, in theory, be located anywhere, although they are generally more common in sandy areas where excavation of graves was easier and especially in more productive areas where population densities would have been higher (e.g. along the coast).

The Anglo-Boer War was fought across the Northern Cape, but information on the role of Kenhardt appears difficult to locate. The town was occupied by the Boers on 25th February 1900 after they convinced the magistrate that they had a large gun and would fire on the town if it did not surrender. They later surrendered to the British who occupied the town on 31st March 1900. By mid-1900 there were perhaps 100 Cape Rebels detained in a camp outside of Kenhardt (Grobler 2004). The British raised a local force known as the Border Scouts in Upington in May 1900. Many were mixed-race individuals, some local farmers, others Kalahari hunters, but all disliked the Boers. The scouts were responsible for a large area of the north-western Cape Colony centred on Upington and Kenhardt. They eventually numbered 786 by January 1901 and were under the command of Major John Birbeck (AngloBoerWar.com 2015; Rodgers 2011). At the beginning of 1902 there were 150 Border Scouts stationed at Kenhardt. Two boers, H.L. Jacobs and A.C. Jooste, were accused of treason and executed in the town on 24 July 1901 (Grobler 2004). A memorial stands there to their honour (Green Kalahari n.d.).

No major action appears to have taken place around Kenhardt, although the Boers are known to have attacked a patrol on 17th May 1901, while the British attacked a Boer position on 25th June 1901 (AngloBoerWar.com 2015).

3.4.3. Cultural and Natural Landscape

The cultural landscape is very poorly developed in this area with fences, water troughs, wind pumps and occasional farm complexes being the primary features. The natural landscape largely lacks visually interesting and sensitive features, although the small quiver tree ‘forest’ located by Orton (2014b) to the southwest of the study area is regarded as a natural heritage resource (ASHA Consulting, 2017).

The vast majority of archaeological material were found and recorded during the survey was of very low significance and does not merit further attention in terms of the siting of the proposed solar energy facilities. These occurrences are generally not worthy of being termed sites, and may be destroyed without any further archaeological work being required.

Immediately alongside the southern boundary of Skeerhok PV 1 there is a large pan that has had its central part excavated out in the past in order to allow for greater water accumulation. The now eroded spoils of this excavation have revealed the presence of Early, Middle and Later Stone Age stone artefacts in the gravels that underlie the present silty surface. This is an unusual feature and, although the artefacts are not in very high density, this does make the site important in archaeological terms. The pan area should be avoided as shown in Figure 3.11 (ASHA Consulting, 2017).

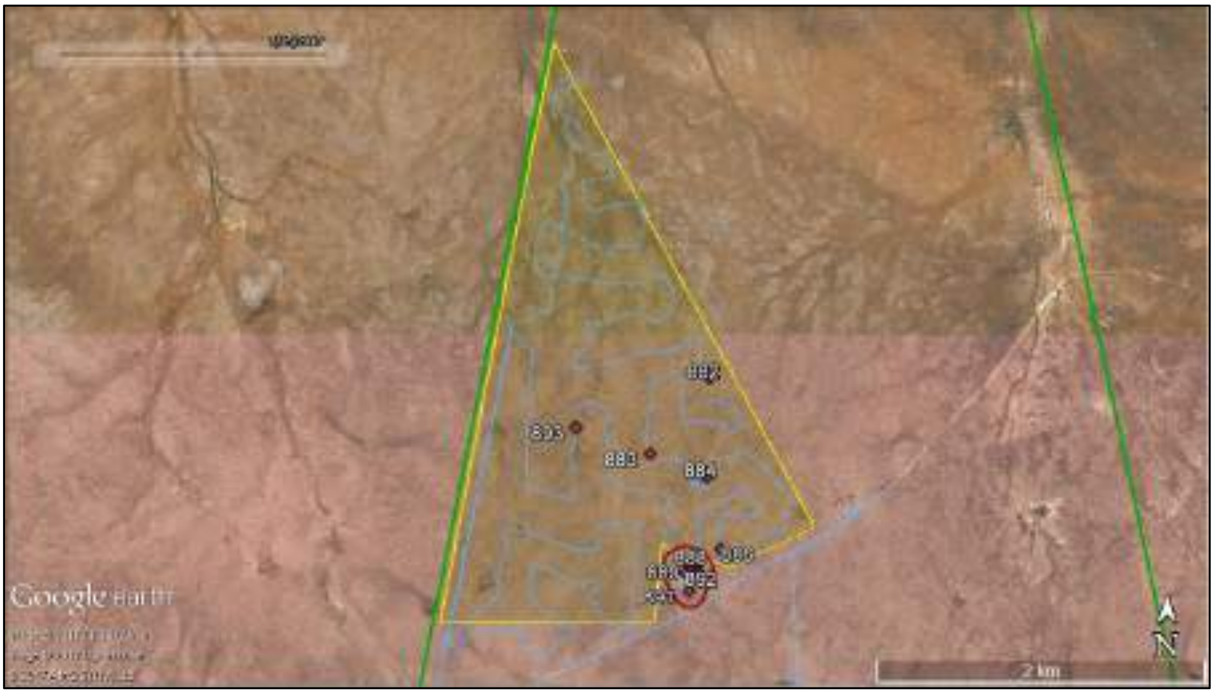

Figure 3.11: Location of findings in and around the Skeerhok PV 1 (ASHA Consulting, 2017).

3.5. Environmental Sensitivity Map

Based on the literature review of the various studies undertaken in the area, as outlined above, and the sensitivities present on site, an environmental sensitivity map has been compiled for the Skeerhok PV 1 development footprint (Figure 3.12). The sensitivities were considered during the EIA phase through various specialist studies.

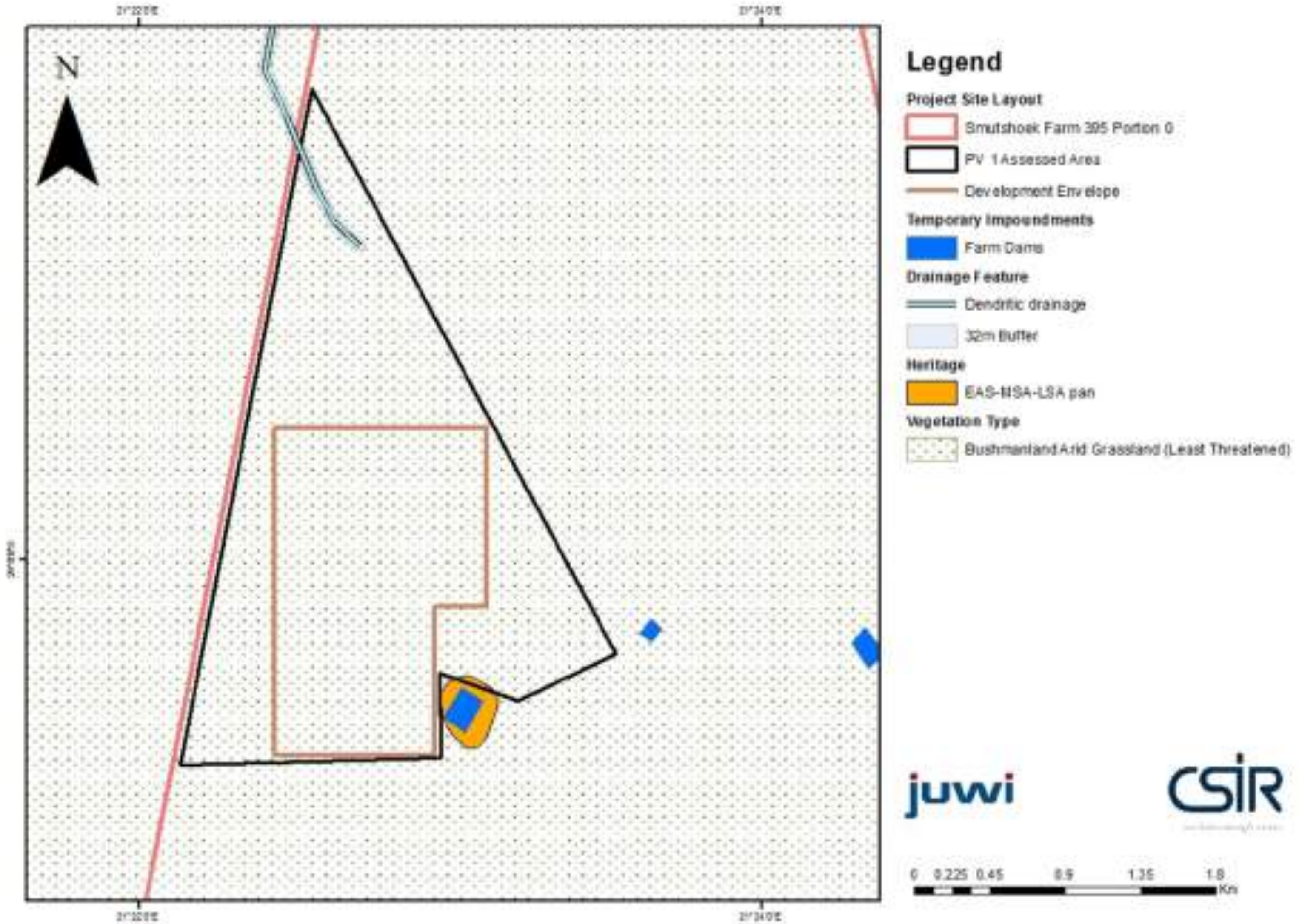

Figure 3.12: Environmental Sensitivity Map for the proposed Skeerhok PV 1 project Site

3.6. Socio-Economic Environment

It must be noted that documented data on the study area, particularly in terms of area specific (i.e. Kenhardt and surrounds) socio-economic data, is very limited. Accordingly, the available data is interpreted in terms of professional opinion and generally accepted trends within the study area and South Africa.

3.6.1. Demographic Profile

The ZF Mgcawu District Municipality (DM) comprises six Local Municipalities namely: Mier; Kai! Garib; Khara Hais; Tsantsabane, !Kheis and Kgatelopele and is classified as a Category C municipality (Figure 3.13). The ZF Mgcawu DM covers an area of approximately 100 000 km^2 (almost 30 % of the Province) (ZF Mgcawu DM IDP, 2014) and according to the 2011 Census has approximately 236 783 inhabitants.

The actual development footprint is located within the !Kheis Local Municipality. However, the closest urban center, Kenhardt, is located in the Kai !Garib Local Municipality.

A total of 16 703 households resides in the Kai !Garib Local Municipality, with 35 % of households being female headed. The total female population dominates the total male population by 8.5 % (Kai !Garib Draft IDP, 2014). Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprise 24.4 % of the population, and the above 65 years age group makes-up 5.1 % of the population of the Kai !Garib Local Municipality. Accordingly, the dependency ratio (i.e. the economically active population vs. the non-economically active population: 24.4 % + 5.1 %) is 29.5 % (du Toit, 2015).

The !Kheis Local Municipality consists of a total of 4146 households, with 34.6 % of households being female headed. Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprises 35 % of the population, and the above 65 years age group makes-up 5.1 % of the population (Statistics SA, 2015).

This data is suggestive of an area with a relatively high level of vulnerable people groups (i.e. woman and children) and, potentially, a corresponding high level of vulnerable households.

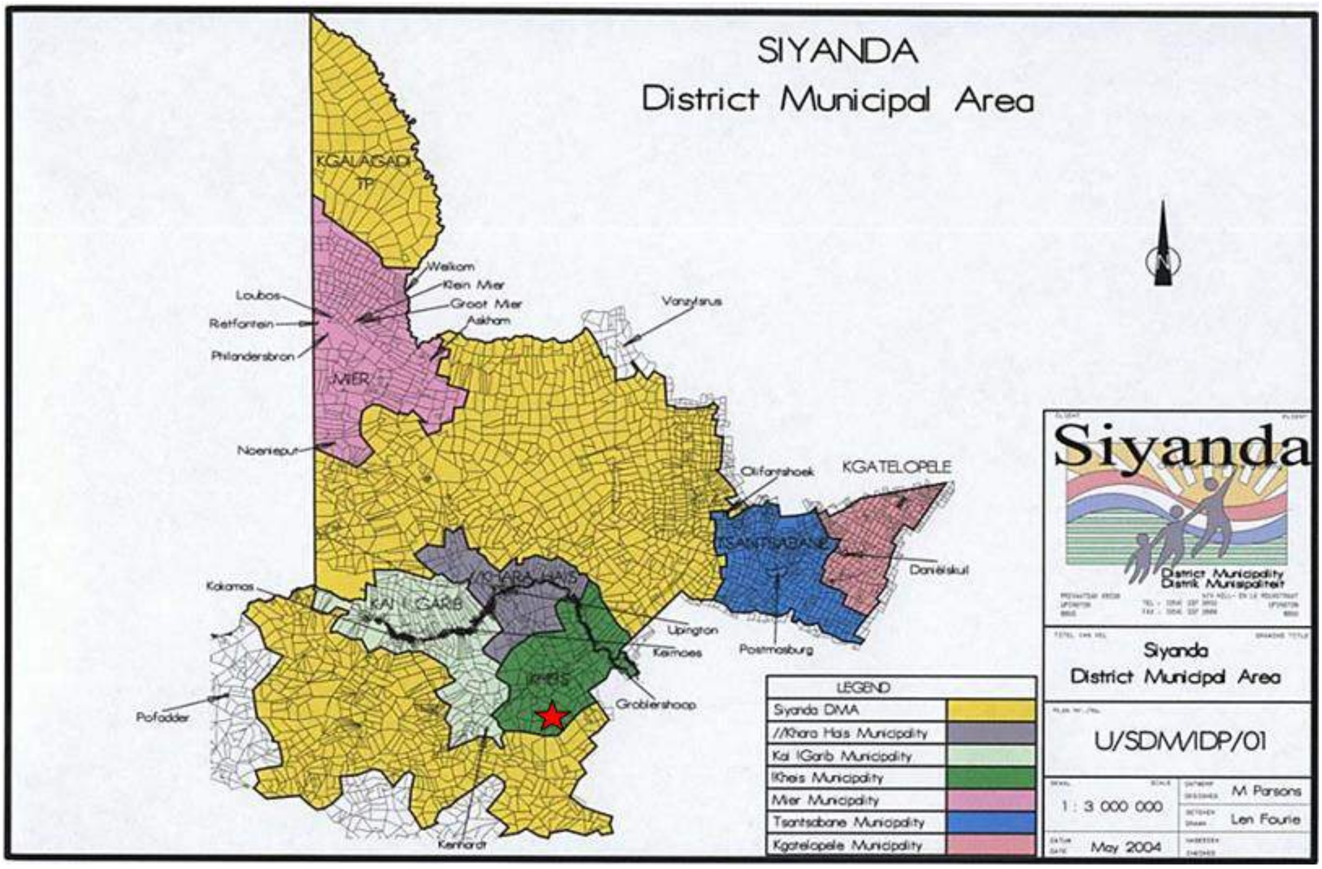

Figure 3.13: Siyanda DM (now known as ZF Mgcawu DM) boundary and boundaries of local municipalities (Siyanda DM IDP, 2013)

The !Kheis Local Municipality, in which the proposed project is located, has a population of 16 637, according to the 2011 Census (Statistics SA, 2015). As shown in Table 3.3, the !Kheis Local Municipality constitutes 8 % of the total population of the ZF Mgcawu DM.

Table 3.3: Population of the Local Municipalities within the ZF Mgcawu DM (Statistics SA, 2011)

Municipality	Census 2001	Census 2011	% of the total population	Difference	Area (Km^2)	Person/Km^2
Mier	7207	7003	3%	493	22468	0.3
Kai Garib	58 617	65 869	24%	799	26357	2.1
//Khara Hais	77 919	93 494	42%	25249	21780	4.6
!Kheis	16 538	16 637	8%	2797	11107	1.7
Tsatsabane	27 082	35 093	12%	4018	18330	1.5
Kgatelopele	14 743	18 687	9%	6755	2478	8.7
Total	**202 106**	**236 783**	**100%**	**35903**	**102520**	**2.3**

Afrikaans is the dominant language (76.4 %) and Setswana the second largest language (15.8 %) spoken in the ZF Mgcawu DM. Within the !Kheis Local Municipality 94 % of the population speaks Afrikaans and 1.9 % Setswana. The population of the ZF Mgcawu DM is predominantly Coloured (61.2 %), followed by Black Africans (29.8 %) and Whites (8.3 %), with the !Kheis Local Municipality containing a similar racial population group composition (as shown in Figure 3.14).

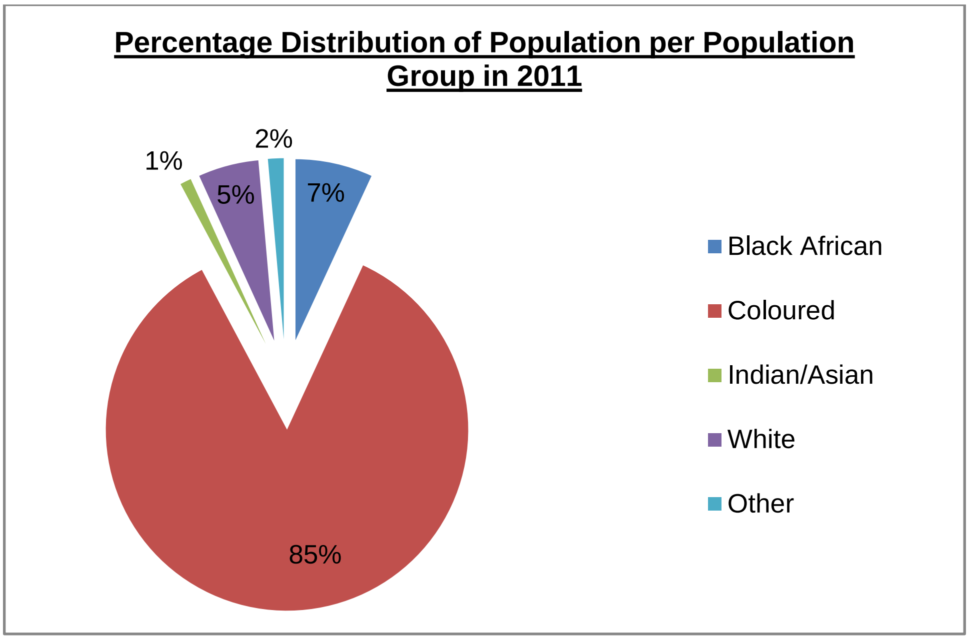

Figure 3.14: Percentage Distribution of Population per Population Group for the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The age distribution of the ZF Mgcawu DM (shown in Figure 3.15 below) is represented by a majority of young people, i.e. persons younger than 40 years old (Statistics SA, 2011).

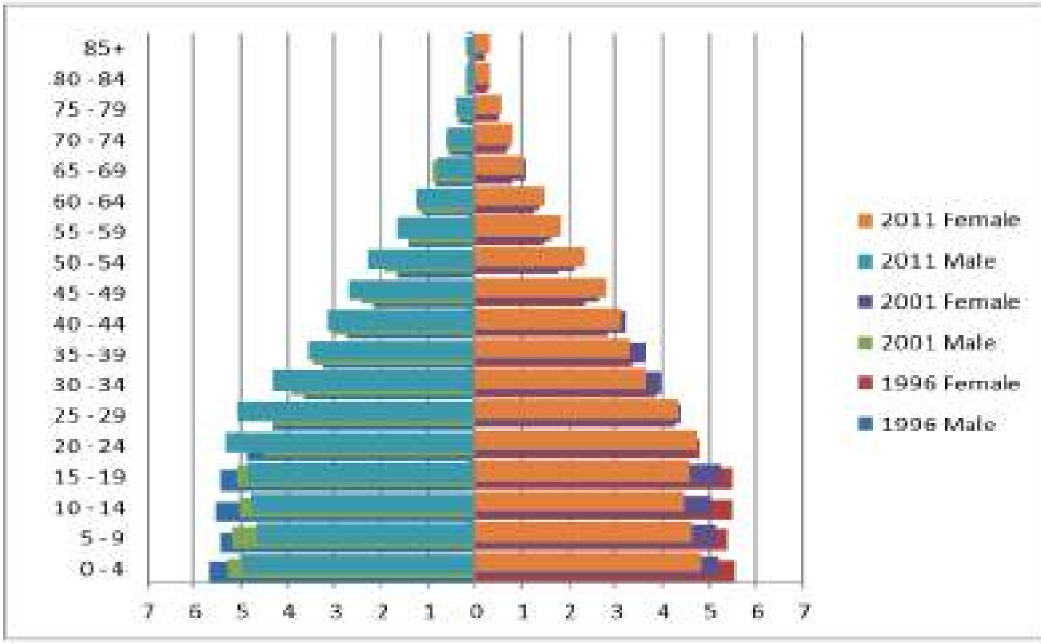

Figure 3.15: Age Distribution of the ZF Mgcawu DM (Statistics South Africa, 2011).

3.6.2. Economic Profile

The Northern Cape Province has the third highest per capita income of all nine provinces; however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. Approximately 60 % of ZF Mgcawu DM's population has an income of between R 0 to R 800 per month. The majority of the population (i.e. 28.30%) within the !Kheis Local Municipality earns between the R 19 601 – R 38 200 income bracket, as shown in Figure 3.16 below, and approximately 7.7 % of the population has no income.

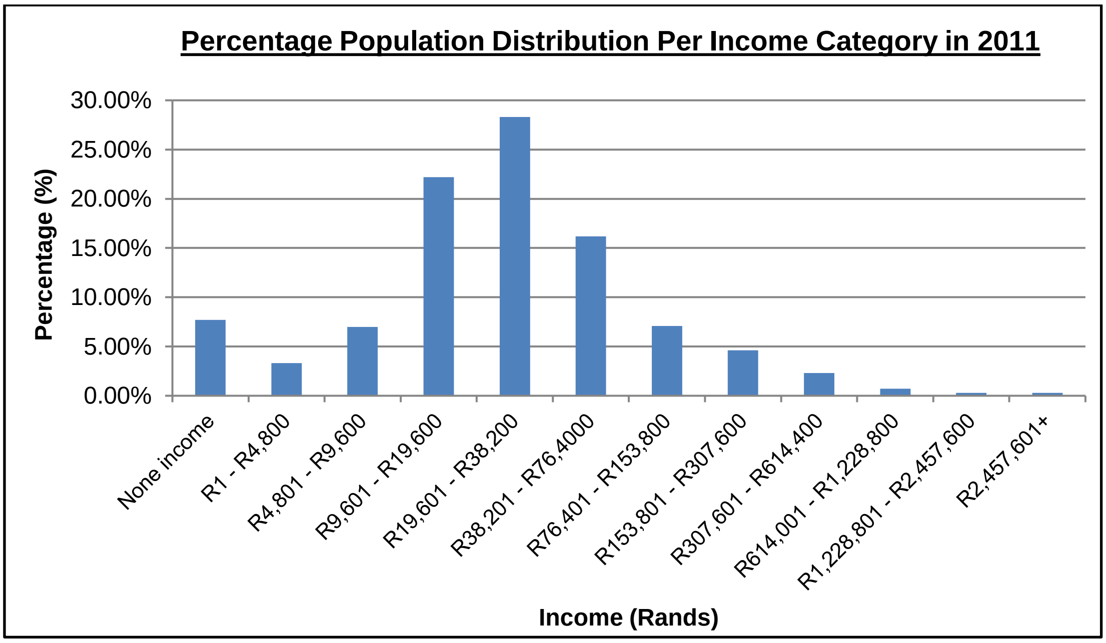

Figure 3.16: Income Distribution of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The 2011 census indicates that 22 % and 34 % of the economically active population (between the ages of 15-34) in the ZF Mgcawu DM and the !Kheis Local Municipality, respectively, are unemployed. The !Kheis Local Municipality has the highest unemployment percentage of all the local municipalities falling within the ZF Mgcawu DM. Also, nearly a third of the population is economically inactive which suggests that individual and household incomes generated in the study area are being used to support a substantial amount of dependents. This in turn exacerbates the level of household vulnerability in the area.

The unemployment rate for the Kheis Local Municipality in 2001 was 20 % and in 2011 was 28 % (Statistics SA, 2015). The official unemployment rate of 10 % (based on the 2011 Census) has decreased by 6.1 % since the 2001 Census measurement of 16.1 % for the Kai !Garib Local Municipality. The economic sector is dominated by agriculture which provides 51.8 % of jobs, followed by the Community and Government Services sector with 15.9 %. The number of jobs generated by the agricultural sector needs to be interpreted within the context of the Kai !Garib Municipality. The vast majority of the land area occupied by the Kai !Garib Municipality consists of agricultural land, accordingly, it is unsurprising that agriculture would register as the major employer at municipal (i.e. regional) level.

However, the distribution of jobs within urban centers, like Kenhardt, does not necessarily follow this agriculturally dominated pattern. If the prevailing practice of predominantly male-oriented employment within the agricultural sector (specifically in terms of sheep farming) is assumed, the 51.8 % of jobs generated by the agricultural sector could in fact be heavily skewed towards men. This in turn is suggestive of a female dominated population which is heavily dependent on other economic sectors (i.e. non-agricultural sectors) for their income, and could very well imply that socio-economic impacts on urban centers, like Kenhardt, could be of more significance than farm-based impacts.

In terms of education, only 9.5 % of the total population of ZF Mgcawu DM has no formal schooling, while 13.5 % of the !Kheis Local Municipality's population is unschooled. Based on the 2011 Census, 3.1 % of the population of the !Kheis Local Municipality has no form of education, 55 % has some primary schooling, 7.5 % completed primary school, 5.7 % completed secondary school and 0.5 % has higher education, as shown in Figure 3.17 below.

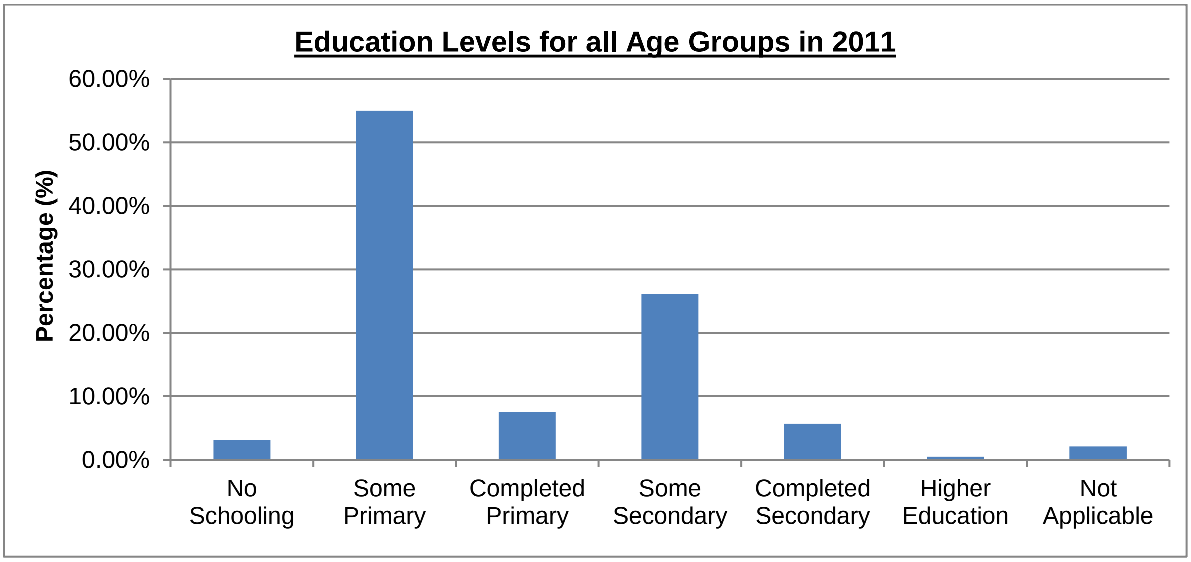

Figure 3.17: Education Levels of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The economy of the ZF Mgcawu DM is dominated by mining and agriculture and accounts for up to 30 % of the Northern Cape's economy. Agriculture is the major industry in the district, contributing to job creation and economic growth. The region is characterised by livestock farming which occurs mainly on large farms that are managed for extensive production. The majority of these farms are privately owned. According to the !Kheis Local Municipality's IDP, the area is ideal for stock-farming, with the main focus being on sheep farming. The stock-farming industry also provides work to local people.

The ZF Mgcawu DM has a unique landscape that has the potential to contribute to and provide for a range of local and international tourist activities and destinations. The main attractions and destinations in the area are the Augrabies Falls National Park and the Kgalagadi Transfrontier Park. The presence of the Orange River is also a tourism asset providing several tourism opportunities. The natural appearance of the area also supports agricultural tourism. The ZF Mgcawu DM IDP indicates that tourism is one of the most important economic sectors in the Northern Cape as well as within the ZF Mgcawu DM boundaries. Tourism is a growing component of the economy of the Northern Cape and the IDP indicates that, after the agricultural sector, the local tourism industry should become the most important economic activity in the area within the next ten years. This is based on the current growth rate in both development and employment.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 4:

Approach to EIA Process and Public Participation

CONTENTS

TABLES

CHAPTER 4. APPROACH TO EIA PROCESS AND PUBLIC PARTICIPATION

This chapter presents the EIA Process to be conducted for the proposed development and gives particular attention to the legal context and guidelines that apply to this EIA, the steps in the Scoping and Public Participation component of the EIA (in accordance with Regulations 41, 42, 43 and 44 of GN R326), and the schedule for the EIA Process.

4.1. Legal Context for this EIA

Section 24(1) of the NEMA states:

- *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization."*

The reference to "listed activities" in Section 24 of the NEMA relates to the regulations promulgated in GN R327, R326, R325 and R324 in Government Gazette 40772, dated 7 April 2017. The relevant Government Notices published in terms of the NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a Basic Assessment, or Scoping and EIA (that is a “full EIA”) be conducted. As noted in Chapter 1 of this Scoping Report, the proposed project requires a full EIA, as it particularly includes, *inter alia*, the inclusion of Listed Activity Number 1 in GN R325:

- *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area, or, on existing infrastructure”.*

All the listed activities potentially forming part of this proposed development and therefore requiring EA were included in the Application Form for EA that was prepared and submitted to the DEA with the Draft Scoping Report. A copy of the letters of acknowledgement from the DEA have been included as Appendix O. The listed activities potentially triggered by the proposed project are indicated in Table 4.1.

Table 4.1: Listed Activities in GN R327 and GN R325 that potentially form part of the proposed Skeerhok PV 1 project

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
	GN R327	
Activity 11	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	Onsite infrastructure including underground cabling for collection of electricity, with a capacity of up to 132kV would be required to connect the proposed PV facility to the proposed onsite central 132 kV substation. The proposed facility is situated outside of the urban edge. This activity would therefore be triggered.
Activity 12 (x) and (xii)	The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- a) within a watercourse; b) in front of a development setback; or c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.	The proposed 100 MWac Solar PV facility will entail the construction of building infrastructure and structures (such as the solar field, offices, workshop, ablution facilities, on-site substation, laydown area and security enclosures etc.). Based on the preliminary sensitivity screening undertaken for the site, drainage features occur onsite and the buildings and infrastructure are expected to exceed a footprint of 100 m^2 and some may occur within 32 m of the watercourses. The proposed project will take place outside of an urban area. *Additional information regarding the presence of watercourses on site is provided in the Ecological & Hyrological Impact Assessment, which is attached to this report as Appendix I.*
Activity 19 (i)	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management	The proposed project will entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles or rock from the nearby watercourses. The proposed project would also entail the infilling of more than 10 m^3 of material into the nearby watercourses. Based on the preliminary sensitivity screening undertaken for the site, drainage features occur on the farm. Construction of the internal gravel access road and/or the construction of infrastructure within drainage lines will require the removal of

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
	plan; c) falls within the ambit of activity 21 in this Notice, in which case that activity applies. d) Occurs within an existing ports or harbors that will not increase the development footprint of the port or harbor; or e) Where such development is related to the development of a port or harbor in which case activity 26 in Listing Notice 2 of 2014 applies.	material. *Additional information regarding the presence of watercourses on site is provided in the Ecological & Hydrological Impact Assessment, which is attached to this report as Appendix I.*
Activity 24 (ii)	The development of a road– (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road– a) which is identified and included in activity 27 in Listing Notice 2 of 2014; or b) where the entire road falls within an urban area.	Existing roads will be used to gain access to the preferred site. The existing roads can be accessed from the R27. Existing internal gravel roads will be used where possible.The internal gravel road of 8 m in width. The proposed project will take place outside of an urban area.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	It is understood that the land is currently used for agricultural purposes (mainly grazing). The proposed 100 MWac solar PV facility (i.e. Skeerhok PV 1), which is considered to be a commercial/industrial development, will have an estimated footprint of approximately 300 ha.
	GN R325	
Activity 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area or on existing infrastructure.	The proposed project will entail the construction of a 100 MWac Solar PV facility (i.e. facility for the generation of electricity from a renewable resource). The proposed project take place outside of an urban area.
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for: (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed 100 MWac solar PV facility (i.e. Skeerhok PV 1) will have an estimated footprint of approximately 300 ha. As a result, more than 20 ha of indigenous vegetation would be removed for the construction of the proposed Solar PV facility. *Additional information regarding the presence of indigenous vegetation on site is provided in the Ecological Impact Assessment, which is attached*

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
		as Appendix I.
GN R324		
Activity 18	The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer: g) Northern Cape ii) Outside Urban Areas: (ii)Areas within 100 meters from the edge of a watercourse or wetland.	This onsite farm road will be widened by more than 4 m. The proposed project will take place outside of an urban area.

Notes regarding the identification of potential listed activities:

- *It should be noted that a precautionary approach was followed when identifying listed activities (for inclusion in the Application for EA and to be assessed as part of the Scoping and EIA Process), i.e. if the activity potentially forms part of the project, it is listed. However, the project description as per the Final EIA report will be shaped by the findings of the EIA Process and certain activities may be added or removed from the project proposal. The DEA and I&APs will be informed in writing of such amendments accordingly.*

- *The relevant listed activities applicable to the construction of the proposed transmission lines and associated electrical infrastructure at the Eskom Nieuwehoop Substation will be included in the* ***separate BA Report*** *and the Applications for EA for the BA Process. As mentioned previously, the Applications for EA for the BA Processes will be lodged with the DEA during the EIA Phase, in order to comply with the timeframes stipulated in Regulation 19 (1) of GN R326.*

4.2. Legislation and Guidelines Pertinent to this EIA

The scope and content of this Draft EIA Report has been informed by the following legislation, guidelines and information series documents:

4.2.1. National Legislation

4.2.1.1. The Constitution of the Republic of South Africa (Act 108 of 1996)

The Constitution, which is the supreme law of the Republic of South Africa, provides the legal framework for legislation regulating environmental management in general, against the backdrop of the fundamental human rights. Section 24 of the Constitution states that:

- "Everyone has the right:
    - to an environment that is not harmful to their health or well-being; and
    - to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that –
        - prevent pollution and ecological degradation;
        - promote conservation; and
        - secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Section 24 of the Bill of Rights therefore guarantees the people of South Africa the right to an environment that is not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps that ensure that the right is upheld and that, among other things, ecological degradation and pollution are prevented.

In support of the above rights, the environmental management objectives of proposed project is to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site.

4.2.1.2. NEMA and EIA Regulations published on 7 April 2017 (GN R327, GN R326, GN R325 and GN R324)

The NEMA sets out a number of principles (Chapter 1, Section 2) to give guidance to developers, private land owners, members of public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA. NEMA, as the primary environmental legislation, is complemented by a number of sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, inter alia i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

4.2.1.3. National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for "the management and conservation of South Africa's biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions". The Act states that the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes inter alia the loss of threatened or protected species. Biodiversity offsets are a means of compensating for the loss of biodiversity after all measures to avoid, reduce or remedy biodiversity loss have been taken. Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the land owner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

An amendment to the NEMBA has been promulgated, which lists 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. Based on the preliminary sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area. This will be confirmed as part of the Ecological Impact Assessment study undertaken during the EIA Phase.

4.2.1.4. The National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for the managements of national heritage resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) (8) of the NHRA apply to the proposed project:

Archaeology, palaeontology and meteorites:
Section 35 (4) No person may, without a permit issued by the responsible heritage resources authority:

a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves:
Section 36 (3) (a) No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:

a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Heritage resources management:
38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:
a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of the site –
    (i) exceeding 5000 m^2 in extent, or
    (ii) involving three or more erven or subdivisions thereof; or
    (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
d) the re-zoning of a site exceeding 10 000 m^2 in extent; or
e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

A Heritage Impact Assessment (including Archaeology and Cultural Landscape) and a desktop Palaeontological Impact Assessment will be undertaken during the EIA Phase of the proposed project. These relevant specialist studies will be included in the EIA Reports that will be released to I&APs for review during the EIA Phase.

Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape) and the SAHRA are required to provide comment on the proposed project in order to facilitate final decision-making by the DEA. To this end and to facilitate comment from the relevant heritage authorities, the proposed project will be loaded onto the South African Heritage Resources Information System (SAHRIS) for comment. An application will be created for each project and all necessary project information was uploaded to the SAHRIS.

Once a final comment has been issued by the heritage authority, the recommendations should be included in the conditions of the EA (should it be granted). This will essentially give ‘permission’ from the heritage authorities to proceed. If any archaeological mitigation is required then this would need to be conducted by an appropriate specialist under a permit issued to that specialist by SAHRA. This permit has no bearing on the developer or development but is purely a way in which the heritage authority can be sure that the mitigation work will be carried out satisfactorily.

4.2.1.5. National Forests Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the National Forest Act (Act 84 of 1998), a licence is required to remove, cut, disturb, damage or destroy any of the listed protected trees. The most recent list of protected tree species was published in November 2014. The Department of Agriculture, Forestry and Fisheries (DAFF) is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. The protected trees that commonly occur in this region are *Acacia erioloba* and *Boscia albitrunca*. The presence of these trees on site will be confirmed as part of the Ecological Impact Assessment to be conducted during the EIA Phase.

4.2.1.6. Conservation of Agricultural Resources Act (Act 43 of 1983)

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or land owner to control invasive alien plants occurring on the land under their control.

Should alien plant species occur within the study area; this will be managed in line with the EMPr. Rehabilitation after disturbance to agricultural land is also managed by CARA. The DAFF reviews and approves applications in terms of these Acts according to their Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, datedSeptember 2011.

4.2.1.7. National Water Act (Act 36 of 1998)

One of the important objectives of the National Water Act (Act 36 of 1998) (NWA) is to ensure the protection of the aquatic ecosystems of South Africa’s water resources. Section 21 of this Act identifies certain land uses, infrastructural developments, water supply/demand and waste disposal as ‘water uses’ that require authorisation (licensing) by the Department of Water and Sanitation (DWS). Chapter 4 (Part 1) of the NWA sets out general principles for the regulation of water use. Water use is defined broadly in the NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering the bed, banks, course or characteristics of a watercourse, removing water found underground for certain purposes, and recreation. In general a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface and ground water.

Section 21 of the Act lists the following water uses that need to be licensed:

a) taking water from a water resource;
b) storing water;
c) impeding or diverting the flow of water in a watercourse;
d) engaging in a stream flow reduction activity contemplated in section 36;
e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) disposing of waste in a manner which may detrimentally impact on a water resource;
h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) altering the bed, banks, course or characteristics of a watercourse;
j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) using water for recreational purposes.

Any activities that take place within a water course or within 500 m of a wetland boundary require a Water Use Licence (WUL) under the Section 21 (c) and Section 21 (i) of the NWA. The need for a Water Use Licence will be determined as part of the Ecological Impact Assessment, which will be conducted during the EIA Phase. However, it is important to note that considerable efforts will be made to place the proposed solar field and project infrastructure outside of wetland areas. The DWS will be consulted with during the EIA Process to confirm the need for a WUL, as well as to seek comment on the proposed project.

4.2.1.8. Astronomy Geographic Advantage (Act 21 of 2007)

The Astronomy Geographic Advantage (Act 21 of 2007) aims to provide for:

- the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy;
- intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and
- matters connected therewith.

The overall purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province, excluding the Sol Plaatjie Municipality, has been declared an astronomy advantage area. The South African MeerKAT radio telescope is currently being constructed about 90 km north-west of Carnarvon in the Northern Cape Province. The MeerKAT radio telescope is a precursor to the Square Kilometre Array (SKA) telescope and will be integrated into the SKA Phase 1 (SKA South Africa, 2014).

The proposed Skeerhok PV 1 project is located approximately 43km north-east of Kenhardt. Kenhardt is located approximately 220 km from Carnarvon. According to the SKA Project Office, the nearest SKA station has been identified as SKA Station ID 2362, at approximately 20 km from the proposed project. Please see **Chapter 6, Section 6.10** for more information.

4.2.1.9. Subdivision of Agricultural Land Act (Act 70 of 1970)

A change of land use (re-zoning) for the development on agricultural land needs to be approved in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). This is required for long term lease, even if no subdivision is required.

4.2.1.10. Development Facilitation Act (Act 67 of 1995)

The Development Facilitation Act (Act 67 of 1995) (DFA) sets out a number of key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;
- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

4.2.1.11. Other Applicable Legislation

Other applicable national legislation that may apply to the proposed project include:

- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Energy Efficiency Strategy of the Republic of South Africa (Department of Minerals and Energy (DME) now operating as Department of Mineral Resources (DMR), March, 2005);
- Promotion of Administrative Justice Act (Act 2 of 2000);
- Civil Aviation Act (Act 13 of 2009) and Civil Aviation Regulations (CAR) of 1997;
- Civil Aviation Authority Act (Act 40 of 1998);
- White Paper on Renewable Energy (2003);
- Integrated Resource Plan for South Africa (2010);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Air Quality Act (Act 39 of 2004);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 31 of 2004);
- National Environmental Management: Waste Management Act (Act 59 of 2008); and
- National Road Traffic Act (Act 93 of 1996).

4.2.2. Provincial Legislation

4.2.2.1. Northern Cape Nature Conservation (Act 09 of 2009)

The Northern Cape Nature Conservation Act (Act 09 of, 2009) and in particular the Northern Cape Conservation: Schedule 2 – Specially Protected Species has reference to the proposed project. This Act aims at improving the sustainability in terms of balancing natural resource usage and protection or conservation thereof. It includes six schedules, as follows:

- Schedule 1 - Specially Protected species;
- Schedule 2 - Protected species;
- Schedule 3 - Common indigenous species;
- Schedule 4 - Damage causing animal species;
- Schedule 5 - Pet species; and
- Schedule 6 - Invasive Species.

With regards to protected flora, the Northern Cape Nature Conservation Act includes a list of protected flora. The plant species potentially present within the proposed project area will be identified as part of the Ecological Impact Assessment specialist study. However, it will be recommended as part of the EMPr, that a detailed plant search and rescue surveybe conducted before the final design process and prior to the commencement of the construction phase. If any of the listed species are found, the relevant permits should be obtained by the Project Applicant prior to their relocation or destruction. In addition, the Provincial Department of Environment and Nature Conservation should be consulted on whether a permit is required for the clearance of indigenous vegetation on site. The Provincial Department of Environment and Nature Conservation have been pre-identified as a key stakeholder and therefore included on the project database (as shown in Appendix C of this Scoping Report).

4.2.2.2. The Provincial Spatial Development Framework for the Northern Cape (Office of the Premier of the Northern Cape, 2012)

The Provincial Spatial Development Framework (PSDF) identified a Solar Corridor where solar projects will be given priority. According to the PSDF, this Solar Corridor "centres around Upington and extends from roughly Kakamas in the north to De Aar in the east" (Department of Co-operative Governance, Human Settlements and Traditional Affairs, 2012, Page 68). The spatial vision for the Northern Cape constitutes a coherently structured matrix of sustainable land-use zones that collectively support a dynamic provincial economy vested in the primary economic sectors, in particular, mining, agriculture, tourism, and the energy industry. Thus, the proposed project falls in line with the spatial development vision for the province.

4.2.3. Local Planning Legislation

4.2.3.1. ZF Mgcawu Spatial Development Framework (Siyanda DM 2012)

The Solar Corridor is seen as an initiative that 'should be pursued vigorously.' The corridor follows the main routes from Prieska to Upington and further along the N10. However, the Spatial Development Framework (SDF) map (Page 221) shows that the corridor also extended along the N14 west. There are also a number of solar energy projects outside these corridors. Proposal SB7 for Southern Bushmanland relates to solar projects: "Sensitively place solar projects within the Solar Corridor with due regard to the visual impact of these facilities and the siting principles in Section 6.3.7".

4.2.3.2. !Kheis Rural SDF (!Kheis Municipality 2014)

Natural scenic beauty of the municipality and production of solar energy are both seen as opportunities based on its existing bio-physical conditions. Tourism opportunities for this municipality potentially relevant to the proposed development include agricultural tourism, landscape tourism and game farms. Solar energy projects are suggested for the remote areas of the municipality although no indication is given where this should be (other than the Solar Corridor).

4.2.3.3. Kai !Garib IDP (Kai !Garib Municipality 2014)

Kenhardt and its surrounding rural area are seen as an agricultural region with a scenic environment and important cultural heritage. Dust pollution is seen as factor that "must be taken into consideration with future developments". It was noted that the municipality is "very optimistic about the future due to the rise of Solar Energy Developments in the municipal area". The IDP concurred that climate of the municipal area is favourable to this environmental friendly source of energy.

4.2.3.4. Guidelines, Frameworks and Protocols

- Public Participation Guideline, October 2012 (Government Gazette 35769);
- DEADP and DEA Guidelines published in terms of the NEMA EIA Regulations, in particular:
    - Guideline on Alternatives (DEA, 2014)
    - Guideline on Transitional Arrangements (DEADP, March 2013);
    - Guideline on Alternatives (DEADP, March 2013);
    - Guideline on Public Participation (DEADP, March 2013); and
    - Guideline on Need and Desirability (DEADP, March 2013);
- Information Document on Generic Terms of Reference for EAPs and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 – 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEADP; CSIR and Tony Barbour, 2005 – 2007);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

4.2.4. International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed Skeerhok PV 1 project will, as far as practicable, incorporate the environmental and social policies of the International Finance Corporation (IFC). These policies provide a frame of reference for lending institutions to review of environmental and social risks of projects, particularly those undertaken in developing countries.

Through the Equator Principles, the IFC's standards are now recognised as international best practice in project finance. The IFC screening process categorises projects into A, B or C in order to indicate relative degrees of environmental and social risk. The categories are:

- Category A - Projects expected to have significant adverse social and/or environmental impacts that are diverse, irreversible, or unprecedented.
- Category B - Projects expected to have limited adverse social and/or environmental impacts that can be readily addressed through mitigation measures.
- Category C - Projects expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, projects such as the proposed Skeerhok PV 1 project are categorised as Category B projects. The EA Process for Category B projects examines the project's potential negative and positive environmental impacts and compares them with those of feasible alternatives (including the 'without project' scenario). As required for Category B projects a Scoping and EIA Process is being undertaken for the Skeerhok PV 1 project

Other Acts, standards and/or guidelines which may also be applicable will be reviewed in more detail as part of the specialist studies to be conducted for the EIA.

4.3. Principles for Public Participation

The PPP for this Scoping and EIA Process is being driven by a stakeholder engagement process that will include inputs from authorities, I&APs, technical specialists and the project proponent. Guideline 4 on "Public Participation in support of the EIA Regulations" published by DEAT in May 2006, states that public participation is one of the most important aspects of the EA Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority (CA) to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently.

- "Provides an opportunity for I&APs, EAPs and the CA to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
    - Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;
    - Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
    - Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;
    - Is an important aspect of securing transparency and accountability in decision-making; and
    - Contributes toward maintaining a healthy, vibrant democracy."

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the EIA team.
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.

- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP will aim to obtain an indication of trade-offs that all stakeholders (i.e. I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the project.

4.4. Public Participation Process

The key steps in the PPP for the EIA Phase are described below. This approach has been confirmed with the DEA through their review and acceptance of the Plan of Study for EIA (as shown in Appendix O of this EIA Report). The PPP for the Scoping Process is described in Chapter 4 of the finalised Scoping Report (CSIR, 2017).

As discussed in Chapter 1 of this EIA Report, an integrated PPP will be undertaken for the three Scoping and EIA projects (i.e. Skeerhok PV 1, Skeerhok PV 2, and Skeerhok PV 3). Separate Scoping, BA and EIA Reports have been compiled for each project and these have been made available for I&AP and authority review in an integrated manner **<u>(note: should there be a time period/date difference between the PPP for the EIA reports and the BA report, this will be clearly stipulated to I&Aps and catered for)</u>**. All advertisements, notification letters and emails etc. will serve to notify the public and organs of state of the joint availability of all reports for the abovementioned projects and will provide I&APs with an opportunity to comment on the reports. As previously noted, the BA Report has been released with the EIA Reports in order to comply with the timeframes stipulated in the 2014 EIA Regulations, as amended. This approach is proposed due to the close proximity of the sites (i.e. the proposed projects will take place within the same geographical area) and that proposed project will entail the same activity (i.e. generation of electricity with the use of solar PV panels).

The correspondence sent to I&APs during the Scoping Phase (including the submission of the finalised Scoping Reports to the DEA) is included in Appendix E of this EIA Report. Appendix G contains all the comments and correspondence received from I&APs during the Scoping Phase (i.e. during the Project Initiation Phase and 30-day review of the Scoping Reports). Appendices E and G will be respectively updated with correspondence sent to I&APs for the release of the EIA Reports, and any comments received from I&APs during the review of the EIA Report.

TASK 1: I&AP REVIEW OF THE EIA REPORT AND EMPR (CURRENT STAGE)

The first and current stage in the process entails the release of the Draft EIA Reports for a 30-day I&AP and stakeholder review period. Relevant organs of state and I&APs will be informed of the review process in the following manner:

- Placement of one advertisement in The Gemsbok local newspaper to notify potential I&APs of the availability of the DEIA Reports;
- A letter will be sent via registered mail and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include notification of the 30-day comment period for the EIA Reports, as well as an invitation to attend the public meeting and/or focus group meetings, if required.

- A public meeting could possibly be held during the review of the EIA Report, if warranted, and if there is substantial public interest during the EIA Phase. Furthermore, telephonic consultations with key I&APs will take place, upon request; and
- Meeting(s) with key authorities involved in decision-making for this EIA (if required and requested).

The DEIA Reports will be made available and distributed through the following mechanisms to ensure access to information on the project and to communicate the outcome of specialist studies:

- Copies of the reports will be placed at the Kenhardt local library for I&APs to access for viewing;
- Key authorities will be provided with either a hard copy and/or CD of the EIA Reports;
- The EIA Reports will be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment) and
- Telephonic consultations will be held with key I&AP and organs of state groups, as necessary.

TASK 2: COMMENTS AND RESPONSES TRAIL

A key component of the EIA Process is documenting and responding to the comments received from I&APs and the authorities. The following comments on the EIA Reports will be documented:

- Written and emailed comments (e.g. letters and completed comment and registration forms);
- Comments made at public meetings and/or focus group meetings (if required);
- Telephonic communication with CSIR project team; and
- One-on-one meetings with key authorities and/or I&APs (if required).

The comments received during the 30-day review of the DEIA Reports will be compiled into a Comments and Responses Trail for inclusion in Appendix H to the EIA Reports that will be submitted to the National DEA in terms of Regulation 23 (1) (a) for decision-making. The Comments and Responses Trail will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided will indicate how the comment received has been considered in the EIA Reports for submission to the National DEA and in the project design and EMPRs.

TASK 3: COMPILATION OF EIA REPORTS FOR SUBMISSION TO THE DEA

Following the 30-day commenting period of the DEIA Reports and incorporation of the comments received into the reports, the Final EIA Reports (i.e. hard copies and electronic copies) will be submitted to the DEA for decision-making in line with Regulation 23 (1) of the 2014 amended EIA Regulations. In line with best practice, I&APs on the project database will be notified via email (where email addresses are available) of the submission of the EIA Reports to the DEA for decision-making.

The EIA Reports that are submitted for decision-making will also include proof of the PPP that was undertaken to inform organs of state and I&APs of the availability of the EIA Reports for the 30 day review (during Task 1, as explained above). To ensure ongoing access to information, copies of the EIA Reports that are submitted for decision-making and the Comments and Response Trail (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website https://www.csir.co.za/environmental-impact-assessment)

The DEA will have 107 days (from receipt of the EIA Reports) to either grant or refuse EA (in line with Regulation 24 (1) of the 2014 amended EIA Regulations).

TASK 4: EA AND APPEAL PERIOD

Subsequent to the decision-making phase, if an EA is granted by the DEA for the proposed projects, all registered I&APs and stakeholders on the project database will receive notification of the issuing of the EA and the appeal period. The 2014 EIA Regulations, as amended (i.e. Regulation 4 (1) states that after the Competent Authority has reached a decision, it must inform the Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) if the 2014 EIA Regulations stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure and its respective timelines.

The following process will be followed for the distribution of the EA (should such authorisation be granted by the DEA) and notification of the appeal period:

- Placement of one advertisement in The Gemsbok local newspaper to notify I&APs of the EA and associated appeal process;
- A letter will be sent via registered mail and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EA;
- A copy of the EA will be uploaded to the project website (https://www.csir.co.za/environmental-impact-assessment) and
- All I&APs on the project database will be notified of the outcome of the appeal period in writing.

4.5. Authority Consultation during the EIA Phase

Authority consultation is integrated into the PPP, with additional one-on-one meetings held with the lead authorities, where necessary. It is proposed that the Competent Authority (DEA) as well as other lead authorities will be consulted at various stages during the EIA Process. At this stage, the following authorities have been identified for the purpose of this EIA Process (additional authorities might be added to this list as the EIA Process proceeds):

- National DEA;
- Department of Environment and Nature Conservation of the Northern Cape Province;
- DWS of the Northern Cape Province;
- Department of Energy of the Northern Cape Province;
- Department of Mineral Resources of the Northern Cape Province;
- Eskom Holdings SOC Ltd;
- Transnet SOC Ltd;
- South African National Parks;
- Department of Social Development;
- National Energy Regulator of South Africa;
- National DAFF;
- DAFF of the Northern Cape Province;

- Department of Agriculture, Land Reform & Rural Development of the Northern Cape Province;
- Department of Public Works, Roads and Transport of the Northern Cape Province;
- Department of Labour;
- SKA;
- SAHRA;
- Ngwao Boswa Kapa Bokoni (Heritage Northern Cape);
- South African Civilian Aviation Authority;
- South African National Road Agency Limited;
- ZF Mgcawu District Municipality;
- Kai! Garib Local Municipality; and
- !Kheis Local Municipality.

The authority consultation process for the EIA Phase is outlined in Table 4.2 below.

Table 4.2: Authority Communication Schedule

STAGE IN EIA PHASE	FORM OF CONSULTATION
During the EIA Process	Site visit for authorities, if required.
During preparation of EIA Reports	Communication with the DEA on the outcome of Specialist Studies, if required
On submission of EIA Reports for decision-making	Meetings with dedicated departments, if requested by the DEA, with jurisdiction over particular aspects of the project (e.g. Local Authority) and potentially including relevant specialists.

4.6. Approach to Impact Assessment and Specialist Studies

This section outlines the assessment methodology and legal context for specialist studies, as recommended by the DEA 2006 Guideline on Assessment of Impacts.

4.6.1. Generic TOR for the Assessment of Potential Impacts

The identification of potential impacts should include impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts is to include direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts will include:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

The impact assessment methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (j) of the 2014 EIA Regulations, which states the following:

- An EIA Report must contain the information that is necessary for the CA to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including -
  - (i) cumulative impacts;
  - (ii) the nature, significance and consequences of the impact and risk;
  - (iii) the extent and duration of the impact and risk;
  - (iv) the probability of the impact and risk occurring;
  - (v) the degree to which the impact and risk can be reversed;
  - (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
  - (vii) the degree to which the impact and risk can be mitigated.

As per the DEAT Guideline 5: Assessment of Alternatives and Impacts the following methodology is to be applied to the predication and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. The DEA has stated that no more that 6 approved facilities in this area (within a 20 km radius) will be awarded preferred bidder status (due to the impact to the SKA). However, this assessment will be based on the precautionary approach i.e. assume that all projects will be developed within the area and therefore assuming worst case scenario.

  Please see below a map **(Figure 4.6)** indicating projects that were **considered as part of the cumulative impact assessment.**

In addition to the above, the impact assessment methodology includes the following aspects:

- **Spatial extent** – The size of the area that will be affected by the impact/risk:
  - Site specific;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).

- **Consequence** – The anticipated consequence of the risk/impact:
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);

   - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
   - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
   - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

- **Duration** – The timeframe during which the impact/risk will be experienced:
   - Very short term (instantaneous);
   - Short term (less than 1 year);
   - Medium term (1 to 10 years);
   - Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or
   - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **Reversibility of the Impacts** - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
   - Yes: High reversibility of impacts (impact is highly reversible at end of project life);
   - Partially: Moderate reversibility of impacts; or
   - No: Impacts are non-reversible (impact is permanent).

- **Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks** – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
   - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
   - Moderate irreplaceability of resources;
   - Low irreplaceability of resources; or
   - Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact/risk occurring:
   - Very likely;
   - Likely;
   - Unlikely;
   - Very unlikely; and
   - Extremely unlikely.

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (as shown in Figure 4.4). This approach incorporates internationally recognised methods from the IPCC (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity. The significance is then rated qualitatively as follows against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 4.4:

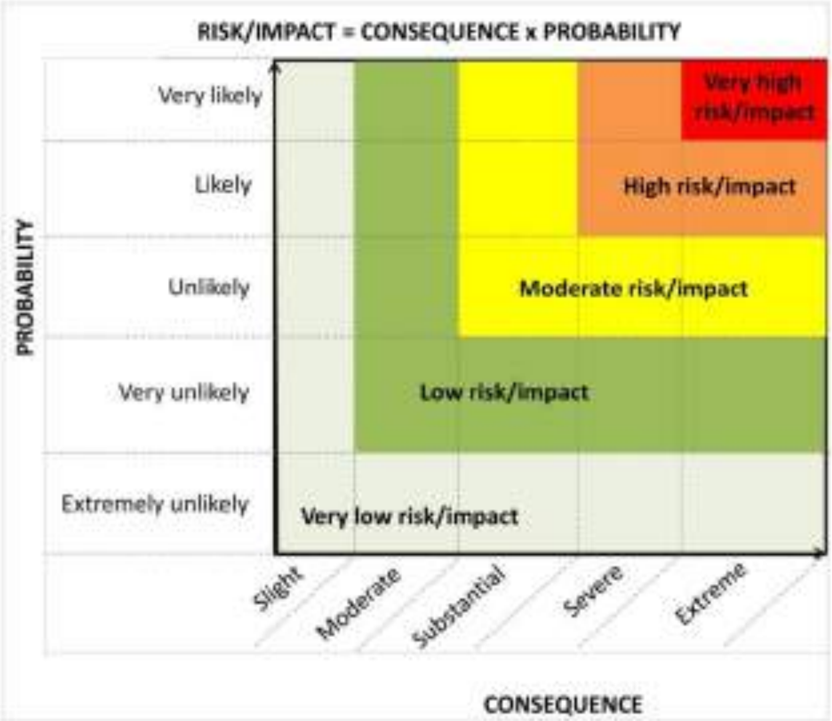

Figure 4.1: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
  - High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
  - Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

  With the implementation of mitigation measures, the residual impacts/risks will be ranked as follows in terms of significance (based on Figure 4.4):

  - Very low = 5;
  - Low = 4;
  - Moderate = 3;
  - High = 2; and
  - Very high = 1.

- **Status** - Whether the impact/risk on the overall environment will be:
  - Positive - environment overall will benefit from the impact/risk;
  - Negative - environment overall will be adversely affected by the impact/risk; or
  - Neutral - environment overall not be affected.

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Impacts will then be collated into the EMPr and these will include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Positive impacts will be identified and augmentation measures will be identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts will be evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

Table 4.3 is to be used by specialists for the rating of impacts.

Table 4.3: Example of Table for Assessment of Impacts

Aspect/Impact Pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/ Risk	Confidence Level
										Without Mitigation	***With Mitigation***		
CONSTRUCTION PHASE (EXAMPLE)													
Clearing of 300 ha of vegetation	Loss of Habitat and Species	Negative	Site Specific	Long term	Substantial	Very Likely	Yes	Moderate	Undertake Plant Search and Rescue prior to the commencement of construction	Moderate	Low	4	Medium
	Susceptibility of soil erosion on exposed surfaces	Negative	Site Specific	Medium term	Moderate	Likely	Yes	Moderate	Implement an Erosion Management Plan throughout the construction Phase	Moderate	Low	5	High

4.6.1.1. TORs for Cumulative Impact Assessment

Figure 4.5 below presents the known relevant projects within a 20km radius of the proposed Skeerhok PV 1 project. There are 14 solar PV projects in this radius including the 3 Skeerhok PV projects. DEA has stated that no more than 6 of these projects can be awarded preferred bidder status due to the constraints of the SKA project, but for the purposed of this cumulative impact assessment we have assumed the worst case scenario of all projects being built.

The cumulative impact assessment for each field of study have been detailed in the **sub-sections and relevant impact tables in Chapter 6.** The cumulative impacts have assessed by identifying other solar energy project proposals and other applicable projects, such as construction and upgrade of electricity generation, transmission or distribution facilities in the local area (i.e. within 20 kms of the proposed Skeerhok PV projects) that have been approved (i.e. positive EA has been issued) or the EIA is currently underway.

The cumulative effects associated with these similar types of projects include inter alia

- Traffic generation;
- Avifaunal collisions and mortalities;
- Habitat destruction and fragmentation;
- Loss of agricultural land;
- Removal of vegetation;
- Increase in stormwater run-off and erosion;
- Increase in water requirements;
- Job creation;
- Increased interference to the SKA project;
- Social upliftment; and
- Upgrade of infrastructure and contribution of renewable energy into the National Grid.
- EMI concerns on the SKA

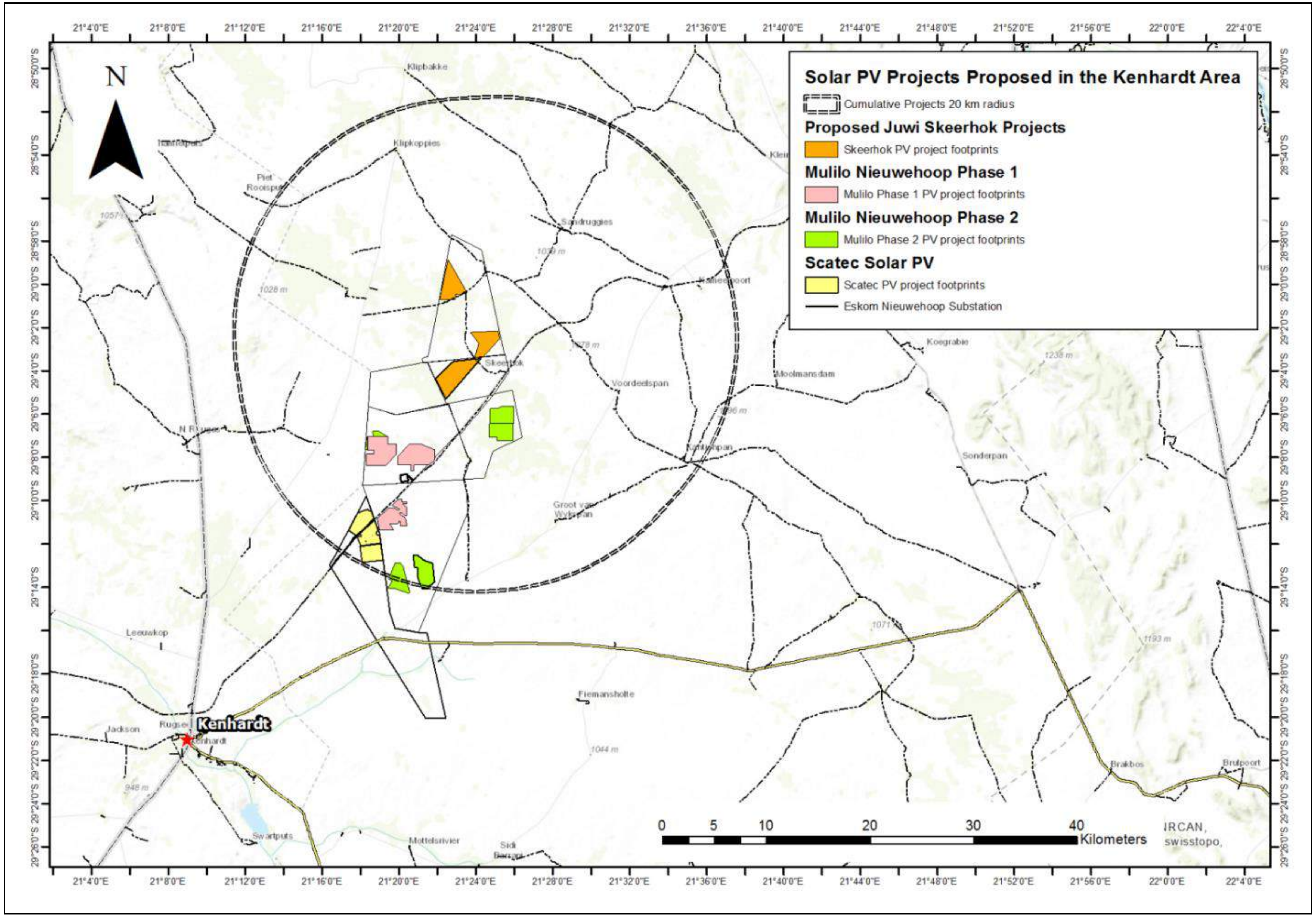

Figure 4.5: Cumulative locality map for projects within a 20km radius of the proposed Skeerhok PV 1, 2 and 3 proje

4.7. TORs for the Specialist Studies

The TORs for the specialist studies will essentially consist of the generic assessment requirements and the specific issues identified for each discipline. The Specialists Reports can be seen attached as **Appendices I to N** to this DEIAR.

The following specialist studies have been identified based on the issues identified to date, as well as potential impacts associated with the project. The TORs for each specialist study is discussed in detail below. The specialist studies and associated specialists are shown in Table 4.4 below. It is important to note that due to the large number of existing studies completed in the area, as well as the large amount of research and information that is readily available, certain specialist studies (i.e. agricultural potential, traffic and social) have not been commissioned, however, traffic, agricultural potential and social impact statement will be compiled by the EAP, based on existing studies undertaken in the area, and reviewed by suitably qualified specialists.

Table 4.4: Specialist Studies and Associated Specialists

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Simon Bundy	Sustainable Development Projects (SDP)	Ecological Impact Assessment (including Terrestrial and Aquatic Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Andrea Gibb	SiVEST	External review of the VIA
Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Christo Bredenhann	WSP	Review of the Traffic Impact Statement complied by the CSIR using exisiting studies in the project area.
Rudolph du Toit	N/A	Review of the Social Impact Statement complied by the CSIR using exisiting studies in the project area.
Johann Lanz	N/A	Review of the Soils and Agricultural Impact Statement complied by the CSIR using exisiting studies in the project area.

Cumulative impacts have been assessed in the specialist studies (as applicable) by considering the 6 approved facilities in this area (within a 20 km radius) which may be awarded preferred bidder status (due to the impact to the SKA), as stated by the DEA. The cumulative impacts have been assessed in terms of each proposed Skeerhok PV projects as well.

A Square Kilometre Array (SKA) RFI Study has been commissioned for the proposed juwi Solar PV projects(s) in Kenhardt. This study has not complied with the requirements of Appendix 6 of the EIA Regulations, since it is a technical assessment to inform the SKA's comment and not an environmental issue required to be addressed via the requirements of the 2014 EIA Regulations, as amended. The Terms of Reference for this study are included in Section 7.8.6 below. **The full RFI study is attached as Appendix P.**

4.7.1. Ecological Impact Assessment

Chapter 6 of the Final Scoping Report highlighted the issues that will be addressed in the Ecological Impact Assessment as part of the EIA Phase of the proposed project. Based on the issues identified, the potential impacts arising should be considered in terms of both the construction and operational phases, where the former is to be considered a short term, rapid impact of varying severity, while the latter is considered to have longer term, more subtle changes in the habitats/sites in question. Impacts are considered to be both negative and positive in nature, depending upon the approach to such issues. The impacts arising as a consequence of the implementation of the proposed project have been considered through the undertaking of a **detailed Ecological Impact Assessment (including terrestrial ecology and hydrology)** which is attached to this report as Appendix I. The findings of the Ecological Impact Assessment have been utilised to identify the most appropriate layout of the site within the development footprint, or any significant or fatal flaws that may arise within a particular site and the preferred layout of the project within the site.

The Ecological Impact Assessment has therefore be undertaken with the following broad TORs as follows:

- Identification of baseline ecological parameters, based upon the floral and faunal state of the preferred site;
- Consideration of ecological drivers upon the proposed sites;
- Consideration of possible changes in drivers as well as direct impacts that would arise as a consequence of the establishment of the proposed facility;
- Identification of significance of such change and integration into impact evaluation methods.
- Provide clearly defined and rated cumulative impacts and where, applicable, quantify the cumulative impact;
- Consideration of mitigation or avoidance measures that may be employed to obviate negative impacts that are identified in the evaluation processes; and
- Final consideration of planning and layout, as well as operations, will be undertaken to assist with the employment of the abovementioned mitigation measures.
- Cumulative Environmental Impact Statement on whether the proposed development must proceed.

Overall, the study includes the following tasks:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial environment and consequences for ecology;
- Draw on desktop information sources, the knowledge of local experts, information published in the scientific press and information derived from relevant EIAs and similar specialist studies previously conducted within the surrounding area;
- Compile a baseline description of the terrestrial ecology of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity. The description will include the major habitat forms within the study sites, giving due consideration to terrestrial ecology (flora) and terrestrial ecology (fauna). The desktop review will be undertaken using spatial data, SANBI conservation data, as well as other related information;

- Provide specific ecological data in respect of the floral components of the site using ground-truthing methods, with an emphasis on those areas considered to be of “high” and possibly, “moderate” sensitivity (based on the desktop study);
- Based on the desktop study, undertake field work and spot sampling across the site to record relevant data and to compile an overview of the habitat under review. The field assessment will aim to confirm the nature and structure of the habitat within the study area from an ecological perspective, and it will aim to identify key ecological components within the study area and in specific, the sensitivity of the prevailing habitat, as well as the identification of any floral components worthy of consideration;
- Collate all data collected during the field work and undertake a statistical review using methodologies that allows for comparison of biological data;
- Incorporate relevant information from other specialist reports/findings if required;
- Provide a detailed terrestrial and aquatic ecological sensitivity map of the site, including mapping of disturbance and transformation on site;
- Identify and rate potential direct, indirect and cumulative impacts on the terrestrial ecology, communities and ecological processes within the site during the construction, operation and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts proposed solar facilities, together with the impact of the proposed project;
- Provide input to the EMPr, including mitigation and monitoring requirements to ensure that the impacts on the terrestrial ecology are limited; and
- Compile an assessment report qualifying the risks and potential impacts on terrestrial ecology in the study area and impact evaluations.

It is important to note that all investigations and interpretation of results will be subject to findings during site reconnaissance, where after methods described above may vary to accommodate such findings.

4.7.2. Visual Impact Assessment

The assessment has followed guidelines for Visual Impact Assessments provided by the Provincial Government of the Western Cape (PGWC) and CSIR (Oberholzer, 2005), and the Landscape Institute of the UK (GLVIA, 2002). Land Planning guides, Spatial Development Frameworks, and IPDs and other documentation relevant to the region will be referenced as part of the study.

The overall objectives of the Visual Impact Assessment specialist study are to identify and investigate potential visual impacts associated with the development of a large solar energy facility and its infrastructure near Kenhardt in the Northern Cape (Report attached as Appendix M). The Visual Impact Assessment has therefore::

- Describe, in sufficient detail, the existing landscape and visual conditions of the surrounding region to form a baseline against which impacts can be measured and compared;
- Identify potential visual impacts that may occur during construction, operational and decommissioning phases of the development, as well as future potential impacts that may occur if the plant is not developed (the “no go” option), both positive and negative impacts;
- Provide clearly defined and rated cumulative impacts and where, applicable, quantify the cumulative impact;

- Assess the severity and significance of the potential impacts in terms of direct, indirect and cumulative impacts;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures which could be implemented to reduce the effect of negative impacts, or enhance the effect of positive impacts, as far as possible; and
- Incorporate and address issues and concerns raised during the Scoping Phase of the EIA where they are relevant to the specialist's area of expertise.
- Provide a cumulative Environmental Impact Statement on whether the proposed development must proceed.

The Visual Impact Assessment has been undertaken in the following manner:

- Desktop Review and Analysis
  - A Geo-Information System (GIS) exercise will be undertaken to quantify the visual impacts because of the development of the proposed SEF.

- Impact Assessment, Mitigation and Report Writing
  - Potential direct, indirect and cumulative visual impacts will be identified and assessed for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facilities, together with the impact of the proposed project.
  - Compile a Visual Impact Assessment report that will focus on measures to reduce negative aspects, compensatory measures to offset negative aspects, and enhancement of positive aspects. Indicators for monitoring the efficacy of mitigation measures will be suggested (for inclusion in the EMPr).

NOTE: The Visual Impact Assessment was done in-house, and thus has been externally reviewed by a qualified specialist. Please see Appendix M for the review letter and CV of the specialist attached. It must be noted that the recommendations for edits to be made to the VIA **<u>have been made</u>** post external review. Appendix M reflects those requested changes by SiVEST.

4.7.3. Heritage Impact Assessment (Archaeology and Cultural Landscape)

The following broad TOR has been specified for the Heritage Impact Assessment (including Archaeology and Cultural Landscape) to be undertaken during the EIA Phase (Report attached as Appendix K):

- Prepare and undertake a desktop study on the fossil heritage, archaeology, and heritage sites within the proposed project area.
- Undertake a detailed field examination of the archaeological sites and heritage features within or in the region of the development area.
- Describe the type and location of known archaeological sites and in the study area, and characterise all heritage items that may be affected by the proposed project.
- Describe the baseline environment and determine the status quo in relation to the specialist study.
- Record sites of archaeological relevance (photos, maps, aerial or satellite images, GPS co-ordinates, and stratigraphic columns).
- Evaluate the potential for occurrence of archaeological features within the study area.

- Identify and rate potential direct, indirect and cumulative impacts of the proposed project on the archaeological heritage for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facilities, together with the impact of the proposed project.
- Compile a report providing a review of archaeological heritage within the study area based on desktop study and new data from fieldwork and analysis.
- Provide recommendations and suggestions regarding archaeological heritage management on site, including conservation measures to ensure that the impacts are limited.
- Provide input to the EMPr, including mitigation measures and monitoring requirements to ensure that the impacts on the archaeology are limited.
- Provide clearly defined and rated cumulative impacts and where, applicable, quantify the cumulative impact;
- Provide a cumulative Environmental Impact Statement on whether the proposed development must proceed.

4.7.4. Desktop Palaeontological Impact Assessment

Based on the low palaeontological sensitivity of the area a desktop Palaeontology Impact Assessment has been conducted. The Palaeontology Impact Assessment has been used to identify possible palaeontological sites or features by making use of desktop sources (Report attached as Appendix L). The study has assessed the significance of such sites, described the possible impact of the proposed project on these sites and provided recommendations for mitigation or monitoring measures where applicable. The desktop study has been conducted in accordance with the requirements of the NHRA.

4.7.5. Avifauna Assessment

The activities that will be undertaken as part of the construction and operation phases of the proposed Skeerhok PV 1 project that will result in potential impacts to avifauna species, and thus bird monitoring has been undertaken (pre-scoping) to understand these impacts up front. The following broad TOR has been specified for the Avifaunal Impact Assessment that has been undertaken during the EIA Phase (Report attached as Appendix J):

- Incorporate more on site data, from all 3 monitoring site visits;
- Provide greater confidence in the findings;
- Develop a site sensitivity map;
- Provide clearly defined and rated cumulative impacts and where, applicable, quantify the cumulative impact;
- Assesse the cumulative impacts of the proposed development when considering other developments in the area and;
- Develop an operational phase monitoring framework.
- Provide a cumulative Environmental Impact Statement on whether the proposed development must proceed.

NB: It is important to note that the study has been conducted according to the best practice guidelines for “assessing and monitoring the impact of solar power generating facilities on birds in Southern Africa” compiled by **BirdLife** in **January 2017.** Compliance with these guidelines has been included in the Avifaunal Specialist Study which is attached as **Appendix J.**

4.7.6. SKA RFI Study

The Full RFI study is attached as **Appendix P.** The Terms of Reference for the Radio Interference Study for the Square Kilometer Array can be seen below:

Terms of reference for the Risk evaluation of the Skeerhok PV 1, 2 and 3 Plants to SKA antenna installations
KEYWORDS
System Level EMC, EMC Environment, SKA
DISTRIBUTION
Juwi Renewable Energies (Pty) Ltd
EXECUTIVE SUMMARY
A high level risk assessment of the potential impact of the proposed Skeerhok developments on the current SKA installation location information will indicate the level of additional mitigation (if any) that will be required based on the proposed design and possible technology partners. Natural terrain barriers such as hills will provide additional shielding between the SKA installations and the proposed plant. This will be presented in the assessment for the worst case scenarios.

4.7.6.1. Background

Three possible locations, Skeerhok 1, Skeerhok 2 and Skeerhok 3 have been identified for a Photovoltaic (PV) development by juwi Renewable Energies (Pty) Ltd. The technology partners are not yet confirmed so assumed technologies were utilised in line with best practise at the time of commissioning the study.

The SKA is a stakeholder mentioned in the Environmental Authorisation of the proposed project. In order to determine whether the planned solar development could have any influence on the SKA, juwi Renewable Energies (Pty) Ltd requested a risk evaluation of the planned development to SKA activities.

4.7.6.2. Scope

This assessment will be a high level desktop study and can be updated based on additional measurement results and design information as it becomes available

4.7.6.3. Intent

The intent of this evaluation is to ensure that the Skeerhok PV facilities pose a low risk of detrimental impact on the SKA by comparing the anticipated emissions from equipment complying to the CISPR 11/22 limits minus the path loss due to distance and terrain to the protection levels required by SKA to ensure interference free operations. Should additional mitigation (shielding and filtering) be required it will be quantified in the report.

4.7.6.4. Methodology

This phase of assessment is based on laboratory tested radio frequency emissions to determine technology risks (power conversion, trackers control systems, etc.) of the renewable energy system and the measurements at a representative site. A second phase of post construction monitoring will be required to confirm results or provide further input. The proposed site of the renewable energy installation is plotted with reference to the closest of the MeerKAT, SKA Phase 1 and SKA Phase 2 telescope locations.

The expected loss as determined by the Irregular Terrain Model [4] (Longley Rice model applicable for frequencies between 20MHz and 20GHz) between the proposed site and nearest SKA stations will be presented in the final report. The reduction in power density of an electromagnetic wave as it propagates is a function of free-space loss (natural expansion of the wave front in free space (i.e. distance between source and receiver), diffraction loss (part of the wave front is obstructed by an obstacle, in this case terrain such as a hill), vegetation and foliage (environment) and the propagation medium (dry/ moist air in this case) to name a few.

Although reference is made to CISPR 11 and CISPR 22, it should be noted that the quasi-peak detector used for CISPR tests will result in low amplitudes being recorded for signals with a low pulse repetition rate. Due to the number of potential sources on the plant and the characteristics of a radio telescope, peak detection (max hold function) has been used when evaluating impulse signals with low repetition rates.

A large number of non-correlated noise sources (inverters, PV panel controls etc.) could increase the noise floor at a receiving site distant from the noise sources, therefor the cumulative effects needs to be addressed.

Assuming that the emissions from each Skeerhok PV plant is attenuated in accordance with an EMC Process Control Plan, such that the individual PV plants will not result in interference at the SKA, then the Skeerhok PV plants are expected to have minimal/ negligible contribution to the potential cumulative impact to the SKA.

4.8. Schedule for the EIA

The proposed schedule for the EIA, based on the legislated EIA Process, is presented in Table 4.5. It should be noted that this schedule could be revised following the comment period on this Draft EIA report, depending on factors such as the time required for decisions from authorities.

Table 4.5: Schedule for the Proposed juwi Skeerhok PV Projects (including the Scoping and EIA Projects and the BA Project)

juwi Kenhardt Solar PV EIAs &BA 2017/18 project schedule

Months (each divided into weeks 1 2 3 4): May-17, Jun-17, Jul-17, Aug-17, Sep-17, Oct-17, Nov-17, Dec-17, Jan-18, Feb-18, Mar-18, Apr-18, May-18, Jun-18, Jul-18, Aug-18

Phase	Task
Inception Phase	Officially commence with project juwi & CSIR kick-off meeting)
	Procure and appoint specialists
End of Inception Phase	
Scoping Phase	Specialists to provide description of receiving environment and Terms of Reference for inclusion in the Scoping Reports
	Prepare Scoping Reports and Plan of Study for EIA (PSEIA)
	Prepare EA application forms
	juwi Review
	Draft Scoping Reports public review period and submission of application
	Collate comments received and integrate into Final Scoping Reports
	juwi Review
	Submission of Scoping Reports and PSEIA to Competent Authority
	Competent Authority to Accept Scoping Reports or Refuse EA
End of Scoping Phase	
EIA Phase	Specialist to provide EIR input based on comments received
	Compile EIRs and EMPRs.
	Compile BA and EMPr
	Prepare EA application form (BA)
	juwi Review
	EIRs and BA Report public review period.
	Collate comments received and integrate into EIRs and BA report.
	juwi Review
	Submission of final EIRs and Ba Report to Competent Authority
End of EIA Phase	
Decision Phase	Competent Authority to Grant or Refuse EA
	Competent Authority to provide written feedback
	Notify I&APs of the EA decision

(yellow)	Public Participation Process
(blue)	CSIR (EAP) timeframes
(green)	DEA (Competent Authority) timeframes
(purple)	Specialist studies
(hatched)	Compulsory PPP exclusion period
(peach)	juwi review timeframe

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 5:

Project Alternatives

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CHAPTER 5. APPROACH TO THE ASSESSMENT OF ALTERNATIVES

This chapter discusses the alternatives that have been considered as part of the EIA Phase. The 2014 amended EIA Regulations (GN R326) define "alternatives", in relation to a proposed activity, "as different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity; or
- operational aspects of the activity; and
- includes the option of not implementing the activity.

The Scoping Report was required to provide a full description of the process followed to reach the proposed preferred activity, site and location within the site, including details of all the alternatives considered and the outcome of the site selection matrix.
Appendix 2 of the 2014 amended EIA Regulations provides the following objectives of the Scoping Process in relation to alternatives:

- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process; and
- To identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment.

For additional information regarding the alternatives that were considered during the Scoping Phase, refer to the finalised Scoping Report (CSIR, 2017).

Sections 24(4) (b) (i) and 24(4A) of the NEMA require an EIA to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24 O(1)(b)(iv) also requires that the Competent Authority, when considering an application for EA, takes into account "where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment".

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

5.1. Assessment of Alternatives

5.1.1. No-go Alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Skeerhok PV 1 project. This alternative would result in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report. The following implications will occur if the "no-go" alternative is implemented:

- No benefits will be derived from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by this project at this location. The proposed 100 MWac facility is predicted to generate just over 200 GW/h per year which could power 20 000 + households;
- The "no go" alternative will not contribute to and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030;
- No potential impact to the SKA project;
- Additional power to the local grid will need to be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO_2 emissions and water consumption;
- Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
- Local communities will continue their dependence on agriculture production and government subsidies. The local municipality's vulnerability to economic downturns will increase because of limited access to capital;
- There will be no opportunity for additional employment in an area where job creation is identified as a key priority. Approximately 1600 (600 direct and 1000 indirect) employment opportunities will be created during the construction period and 200 (50 direct and 150 indirect) employment opportunities will be created during the operation period of the proposed project;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised; and
- The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- There will be no development of solar energy facilities at the proposed location;
- Only the agricultural land use will remain;
- No vegetation will be removed or disturbed during the development of these facilities;
- No change to the current landscape will occur;
- No heritage artefacts will be impacted on; and
- No additional water use during the construction phase and the cleaning of panels during the operational phase.

While the "no-go" alternative will not result in any negative environmental impacts; it will also not result in any positive community development or socio-economic benefits. It will also not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. Hence the "no-go" alternative is not currently the preferred alternative.

5.1.2. Land-use Alternatives

5.1.2.1. Agriculture

At present the proposed site is zoned for agricultural land-use, and is mainly used for livestock grazing. As noted in Chapter 3 of this Environmental Impact Assessment Report, agricultural potential is uniformly low across the preferred and alternative sites and the choice of placement of the proposed facility on the farm therefore has minimal influence on the significance of agricultural impacts. There has been an extensive amount of research conducted in the area for similar facilities and no agriculturally sensitive areas were identified within the area under consideration. Hence, agricultural land use is not a preferred alternative.

5.1.2.2. Renewable Energy Alternatives

Where the "activity" is the generation of electricity, possible reasonable and feasible land-use alternatives for the proposed properties include Biomass, Hydro Energy and Wind Energy. However, based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed to be appropriate for the site. The unsuitability of other renewable energy developments for the site, as well as the potential risks and impacts of each, is discussed below.

Biomass Energy

The proposed project site lacks any abundant or sustainable supply of biomass. According to the South African Renewable Energy Resource Database (SARERD), the project site is identified as having no cumulative biomass energy potential (as shown in Figure 5.1), therefore, the implementation of a Biomass Facility at the proposed site in the Northern Cape is therefore considered to be an unfeasible and unreasonable alternative to the implementation of the proposed solar PV energy facility.

Should biomass energy be selected for the site, significant negative socio-economic implications could be created as it would not be feasible in terms of operations. A biomass facility is also likely to result in unnecessary pollution due to waste generation (especially waste water generated during the operational phase of the biomass facility), traffic impacts and air emissions as a result of operations. A biomass facility is likely to create traffic impacts as the material required for the plant (i.e. biomass) would need to be transported to the site on a regular basis during the relevant seasons

Hydro Energy

The proposed project site lacks any large inland water bodies, which precludes the possibility of renewable energy from small/large scale hydro generation. In terms of micro hydro power potential, the SARERD has classified the proposed project site as "Not Suitable" (as shown in Figure 5.2), therefore, the implementation of a Hydro Energy Facility at the proposed site is also considered to be an unfeasible and unreasonable alternative to the implementation of the proposed solar PV energy facility.

Hydro power is also not noted as a renewable energy source in terms of the municipal IDP.. If a hydro power was to be constructed instead of a solar facility, it will create significant negative socio-economic implications as it would not be feasible in terms of operations at this site location.

Wind Energy

Wind energy is considered to be the most feasible alternative to solar energy when compared to biomass and hydro energy; however the site specific requirements of wind energy facilities make it a less feasible alternative when compared to solar PV. Measurements provided by the Wind Atlas of South Africa (WASA) indicate that the mean wind speed is the highest at the coastal regions of South Africa (as shown in Figure 5.3), and therefore, this alternative is not preferable over solar energy.

Wind energy facilities require that wind turbines are spaced a significant distance from one another. Due to the fact that there is only a certain amount of land available for development, the implementation of a wind energy facility would not make optimum use of that land which is available.

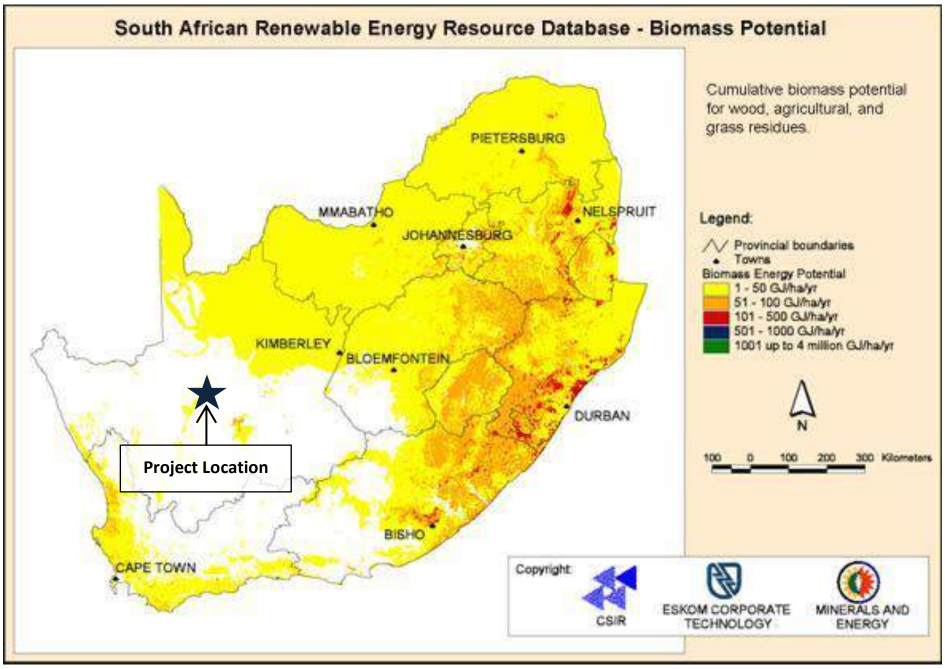

Figure 5.1: Biomass Potential (Source: SARERD, 2016)

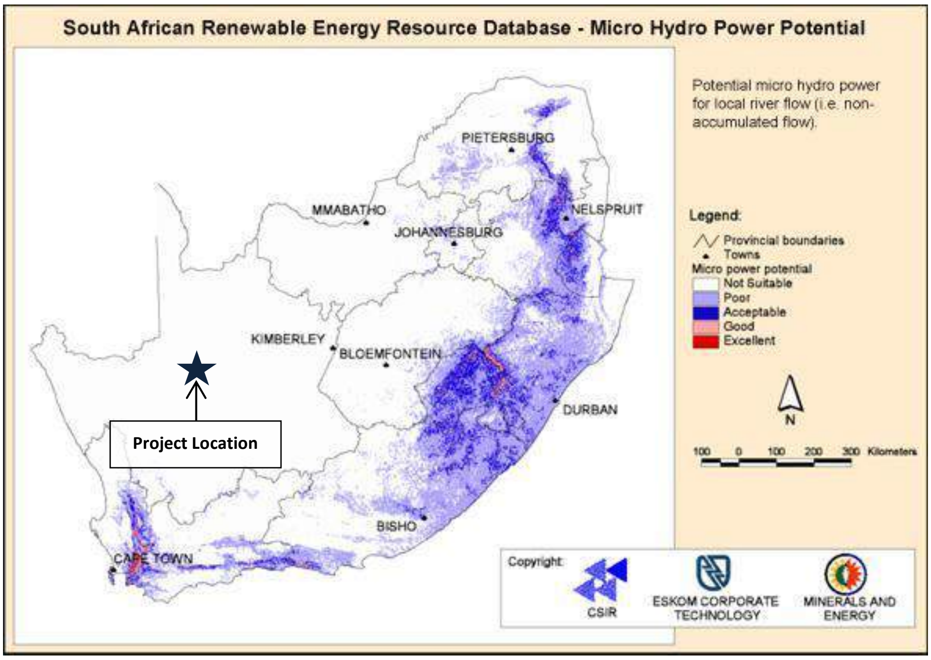

Figure 5.2: Micro Hydro Power Potential (Source: SARERD, 2016)

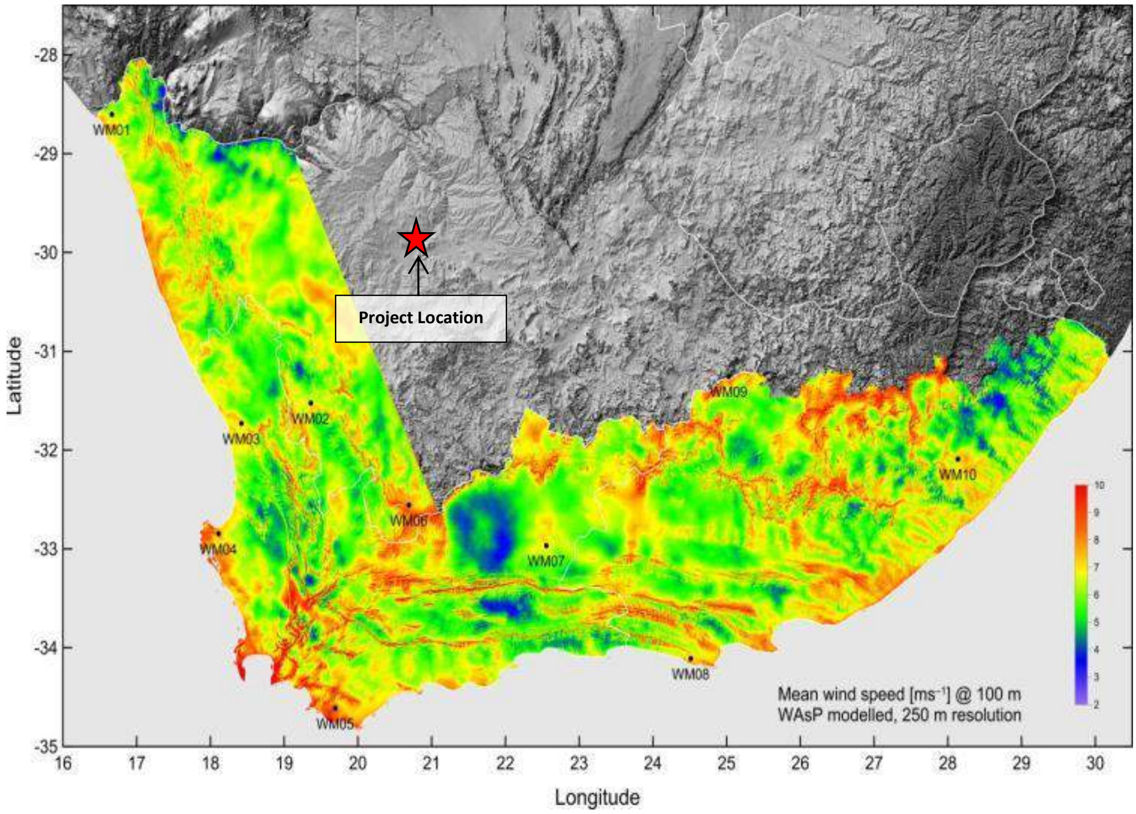

Figure 5.3: Representation of Mean Wind Speed (ms^{-1} at 100 m) (Source: WASA, 2014)

Solar Energy

- *National Level Considerations: Solar Radiation*

The north-western part of South Africa has the highest Global Horizontal Irradiation[1] (GHI), relevant to PV installations (Figure 5.4) and Direct Normal Irradiance[2] (DNI), relevant to CPV and tracking PV installations. Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within KwaZulu-Natal, Eastern Cape and Western Cape mainly have a solar radiation between 1500 kWh/m^2 and 1700 kWh/m^2 per annum, which is not completely feasible for the proposed projects. On the other hand, the Northern Cape (the area with the predominant pink shading in Figure 5.4) has a solar radiation of 2300 kWh/m^2 per annum, which is the highest level. Various developers have received several approvals for PV facilities on farms in the Northern Cape, which shows and justifies the suitability of this area for this type of development.

[1] Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

[2] Direct Normal Irradiance is the amount of solar radiation received per unit area by a surface that is always held perpendicular (or normal) to the rays that come in a straight line from the direction of the sun at its current position in the sky.

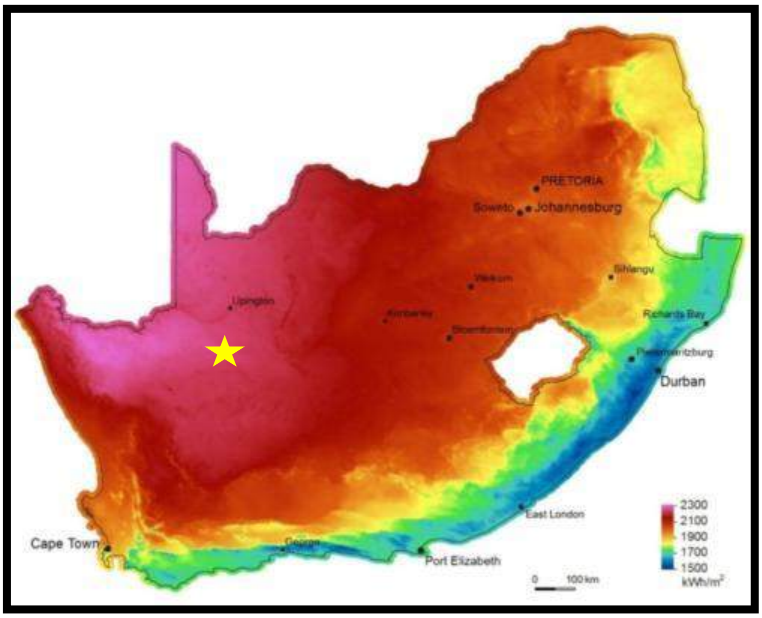

Figure 5.4: Solar Resource Availability in South Africa (Source: SolarGIS map© 2013 GeoModel Solar).

- *REIPPPP and SEA for Wind and Solar PV in South Africa*

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as "IRP2010") and the IRP Updated Report (2013) proposes to secure 17 800 MW of renewable energy capacity by 2030. The DOE subsequently has entered into a bidding process for the procurement of 3725 MW of renewable energy from IPPs by 2016 and beyond to enable the Department to meet this target. On 18 August 2015, an additional procurement target of 6300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in Government Gazette 39111. The additional target allocated for wind energy, solar PV energy, and solar CSP energy is 3040 MW, 2200 MW, and 600 MW respectively.

In order to submit a bid, the proponent is required to have obtained an EA in terms of the EIA Regulations as well as several additional authorisations or consents. As noted in Chapter 1 of this Environmental Impact Assessment Report, the National DEA, in discussion with the DOE, was mandated by MinMec to undertake a SEA[3] to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Wind and Solar PV SEA is in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. The SEA aimed to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as REDZs. Through the identification of the REDZs, the key objective of the SEA was to enable strategic planning for the development of large scale wind and solar PV energy facilities in a manner that avoids or minimises significant negative impact on the environment while being commercially attractive and yielding the highest possible social and economic benefit to the country – for example through strategic investment to lower the cost and reduce timeframes of grid access[4]. Following the completion of the SEA, the proposed REDZs, shown in Figure 5.5, were submitted for Cabinet approval for the rollout of solar PV energy in the Northern Cape, Eastern Cape, Western Cape and Free State provinces, including a 30 day public comment period which began in April 2017. Currently, the REDZ are being finalized by Cabinet (including the incorporation of public comment).

[3] Information on this process can be obtained at: http://www.csir.co.za/nationalwindsolarsea/background.html
[4] More information on the SEA can be read at https://redzs.csir.co.za/

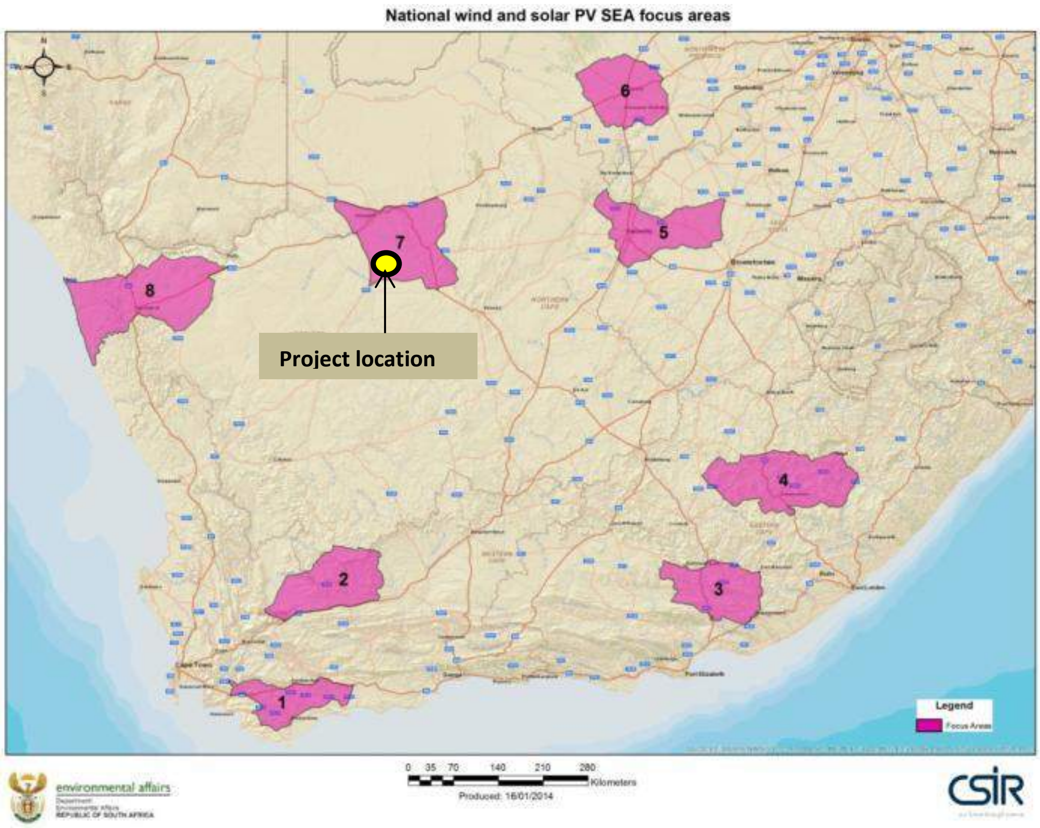

Figure 5.5: **Renewable Energy Development Areas identified in the Strategic Environmental Assessment (the proposed juwi project falls within the REDZ 7)**

The proposed solar facility **currently falls within the REDZ 7.** The proposed project is therefore in line with the criteria of the SEA and located in an area of strategic importance for Solar PV development. It should be noted that even if a project falls within a REDZ, the proposed development still requires site specific assessments as per the site protocol in order to determine the potential impacts of a project at a local and site specific level. **Therefore, the implementation of a solar energy facility at the proposed project site is more favourable and feasible than other alternative energy facilities.**

Therefore in terms of project and location compatibility, the proposed solar facility is considered to be the most feasible renewable energy land use alternative. Since these alternative land-uses were deemed unsuitable for the area and the preferred and alternative sites, these technologies will not be further assessed during the EIA Phase.

5.1.3. Site Alternatives

As noted above, as per the requirements listed within Appendix 2 (2) (g) (ix) of the 2014 amended EIA Regulations, a site selection matrix should be provided to show how the preferred site was determined through a site selection process. Within this context, it is assumed that the “site” referred to in the 2014 amended EIA Regulations is the farm or land portions on which proposed location alternatives will be considered for the proposed project (discussed in Section 5.1.4 below).

On a site specific level, the site was deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, fire risk, current land use and landowner willingness) being favourable. The site selection criteria considered by the Applicant are discussed in detail below.

5.1.3.1. Site Specific Considerations

The site selection process took into account the following factors shown in Table 5.1.

Table 5.1: Site selection factors and suitability of the site (Smutshoek Farm 395)

Factor	Suitability of the Preferred Site
Land Availability	The Smutshoek Farm 395 is of a suitable size for the proposed project. The land available to develop at the development footprint of Skeerhok PV 1 extends approximately 400 ha, while only 300 ha will be required for the facility (i.e. Skeerhok PV 1).
Irradiation Levels	2200 - 2300 kWh/m^2/annum (as shown in Figure 5.4)
Distance to the Grid	An Environmental Authorisation for the construction of the 400/132kV Eskom Nieuwehoop Substation was granted to Eskom Holdings SOC Limited on 21 February 2011 by the DEA (Reference Number: 12/12/20/1166). The substation has been constructed. The proposed project is located approximately 17 km from the Eskom Nieuwehoop Substation.
Site Accessibility	The proposed project site can be accessed via an existing gravel road and the existing Transnet Service Road (private). The existing gravel road can be accessed from the R383 Regional Road via the R27 National Road. The R27 extends from Keimoes (in the north) to Vredendal in the south. The Transnet Service Road can be accessed from the R27. Internal gravel roads will be constructed as part of the proposed project.
Topography	Slope ≤2% (Level to very gentle slope).
Fire Risk	Main vegetation type is Bushman arid grassland, low fire risk.
Current Land Use	Agriculture - Grazing
Landowner Willingness	The landowner has signed consent for the use of the land for the proposed projects. This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed projects being undertaken on the farm).

Furthermore, from an impact and risk assessment perspective, the implementation of a solar PV project on Smutshoek Farm 395 will result in fewer risks in comparison to its implementation at alternate sites within the Northern Cape (i.e. regions with similar irradiation levels). The following risks and impacts will be likely in this case:

- There is no guarantee that suitable land will be available for development of a solar PV facility. Site geotechnical conditions, topography, fire potential and ready access to a site might not be suitable, thus resulting in negative environmental implications and reduced financial viability.
- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example the agricultural potential for alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.

- There is no guarantee that other sites within the Northern Cape will be located close to existing or proposed electrical infrastructure to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

Given the site selection requirements associated with solar energy facilities and the suitability of the land available on Smutshoek Farm 395**, no other location or site alternatives have been considered in the EIA Phase.**

5.1.4. Alternative Locations of the Development Footprint

As shown in Figure 5.6 and discussed in Chapter 1 of this Draft EIA Report, the current project proposal is one of three PV projects proposed on site. The proximity of the site location (preferred) for the Skeerhok PV 1 project to the Nieuwehoop Substation (completed) was the main consideration in terms of technical and economic feasibility of where the preferred site is.

The determination of the development footprint within the site was determined through a desktop screening assessment of the site and consultation with the relevant landowner identifying possible areas that should not be proposed for the development (i.e. no-go areas). These have already been excluded from the proposed development footprint shown in Figure 5.6 below. The land available to develop within the development footprint of Skeerhok PV 1 extends approximately 400 ha, while only 300 ha will be required for the facility. The specialist studies (Appendices H to N) have highlighted sensitive features within the original development footprint, and thus the footprint has been adjusted to avoid such features (Please see Chapter 3 for development footprint overlain with environmental sensitivities)

Therefore, no other alternative locations for the Skeerhok PV 1 project are being proposed.

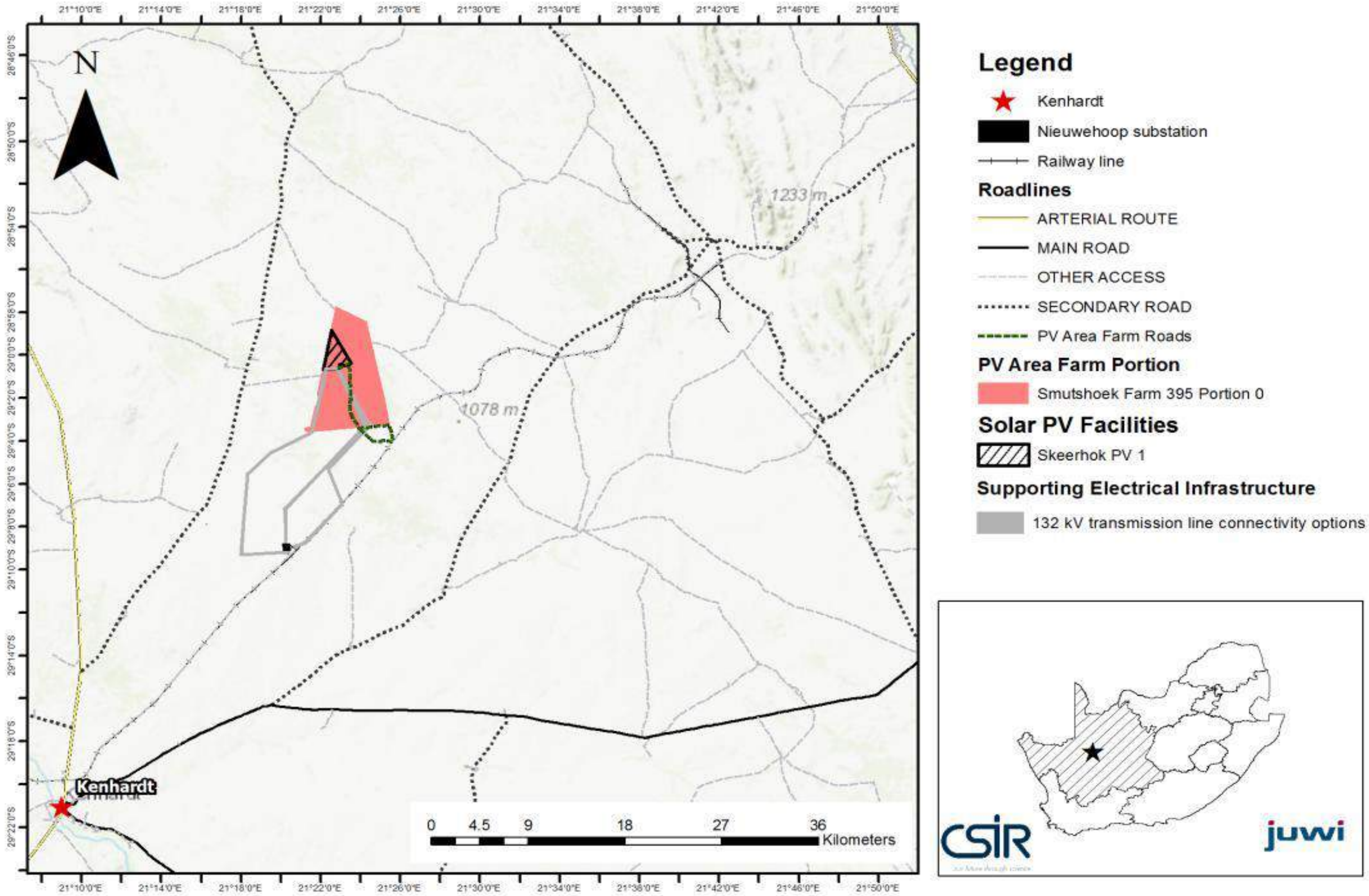

Figure 5.6: Proposed Locality of the proposed Skeerhok PV 1, (including the power line routing, subject to a separate BA process)

5.1.5. Technology Alternatives

5.1.5.1. Solar Panel Types

Only the PV solar panel type will be considered in this EIA, CSP (Concentrated Solar Power) is not considered due to the scarcity of water in the proposed project area and the large volume of water required for CSP, this technology is not deemed feasible or sustainable and will not be considered further. Furthermore, CPV (Concentrated Photovoltaic) technology requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective.Additionally, as noted above, in Government Gazette 39111 published on 18 August 2015, no additional procurement target was allocated for CPV.

5.1.5.2. Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems that will be considered as part of the design are:

- Single axis tracking systems;
- Dual axis tracking systems; and
- Fixed Tilt Mounting Structure.

The above mounting systems have been considered in order to inform the detailed design of the proposed solar facility. In a fixed tilt mounting structure, the PV panels are installed at a set tilt facing north and cannot move, whereas in a single axis tracking system the panels follow the sun (i.e. east to west) to ensure increased exposure to sunlight, this functionality comes at a higher monetary cost to that of fixed tilt. In a dual axis tracking system, the PV panels can follow the sun from east to west, as well as follow the suns altitude (which results in an optimal angle of radiation onto the panel (Vermaak, 2014)). Dual axis tracking systems can therefore follow the sun throughout the day both horizontally and vertically, however this functionality comes at even higher monetary cost. The type of mounting system will be confirmed during the detailed engineering phase.

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5.1.6. Layout Alternatives

As part of the EIA, a larger 400 ha area was assessed by the specialists and considered during this EIA. The determination of the buildable area for the project is discussed above, as well as in Chapters 1 and 2. The Development Envelope has been determined for the project based on the environmental sensitivities present on the site, which is discussed further in Appendices I to N of this EIA Report. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Chapter 3 of this EIA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the larger 400 ha buildable area that was assessed. Based on this map, the preferred location for the 300 ha Skeerhok PV 1 facility (i.e. Development Envelope), avoids the sensitive features that were identified by the specialists within the original 400 ha buildable area. Based on the boundaries of the Development Envelope and the constraints of the environmental sensitivities, a site layout has also been preliminary determined for this project (Chapter 1). It is important to note that should the layout change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the Development Envelope would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the EIA Phase. This is based on the understanding that the specialists have assessed the larger area and have identified sensitivities, which have been avoided in the siting of the proposed infrastructure. The Development Envelope is considered to be a “box” in which the project components can be constructed at whichever location without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the Development Envelope following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

Therefore, the findings of the specialist studies have been used to inform the layout of the proposed facility within the preferred site, Skeerhok PV 1. As noted above, the specialist studies conducted during the EIA Phase have identified the various environmental sensitivities present on site that should be avoided, which were taken into account in the layout of the PV facility.

5.2. Concluding Statement of Preferred Alternatives

As per Appendix 2, Section 2 (xi) of the 2014 amended EIA Regulations, and based on Section 5.1 above, the following alternatives have been taken forward into the EIA Phase:

- **No-go Alternative:**
  - The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Skeerhok PV 1 facility. This alternative would result in no environmental impacts on the site or surrounding local area, as a result of the facility. It is a baseline against which other alternatives have been compared and considered during the EIA Phase.

- **Land Use Alternative:**
  - No other land-use or renewable energy technologies were deemed to be appropriate for the site and therefore these technologies will not be further assessed during the EIA Phase. The implementation of a solar energy facility at the proposed project site is more favourable than other alternative energy facilities (please see reasoning in Section 5.1.2 above)

- **Preferred Site and Development Footprint within the site:**
  - The preferred site for the project is Smutshoek 395 and the Skeerhok PV 1 site; and
  - The preferred development footprint was determined following the outcome of the impact assessment where sensitive features were identified and defined.

- **Technology Alternatives:**
  - Applicable and relevant technology options are described in Chapter 2 of this EIA report, such as those relating to the mounting system.

- **Layout Alternatives:**
  - Layout alternatives for the project were determined following the input from the various specialists by establishing the Development Envelope The studies identified various environmental sensitivities present on the preferred sites that should be avoided, which have been taken into account during the determination of the final layout of the PV facility, which can be seen in Chapter 2.
  - The use of the existing Transnet Service Road or the unnamed farm road also is also discussed in Chapter 2 of this EIA Report. Both access roads have been considered and included in the project description. The access road that will be selected during construction is currently being discussed by the Project Applicant and Transnet.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 6:

Impact Assessment

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6. IMPACT ASSESSMENT

The issues and impacts presented in this chapter have been identified via the environmental status quo of the receiving environment, a review of environmental impacts from other similar renewable projects and input from the specialists that form part of the project team. The impact assessment methodology undertaken for this EIA is included in Chapter 4 (Section 4.6) of this Draft EIA Report, and summarized below.

The impact assessment methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (j) of the 2014 EIA Regulations. As per the DEAT Guideline 5: Assessment of Alternatives and Impacts the following methodology is to be applied to the predication and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. The DEA has stated that no more than 6 approved facilities in this area (within a 20 km radius) will be awarded preferred bidder status (due to the impact to the SKA). However, this assessment will be based on the precautionary approach i.e. assume that all projects will be developed within the area and therefore assuming worst case scenario.

In addition to the above, the impact assessment methodology includes the following aspects:

- **Spatial extent** – The size of the area that will be affected by the impact/risk:
  - Site specific;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).

- **Consequence** – The anticipated consequence of the risk/impact:
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
  - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

- **Duration** – The timeframe during which the impact/risk will be experienced:
  - Very short term (instantaneous);
  - Short term (less than 1 year);
  - Medium term (1 to 10 years);
  - Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or

- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **Reversibility of the Impacts** - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  - Yes: High reversibility of impacts (impact is highly reversible at end of project life);
  - Partially: Moderate reversibility of impacts; or
  - No: Impacts are non-reversible (impact is permanent).

- **Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks** – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact/risk occurring:
  - Very likely;
  - Likely;
  - Unlikely;
  - Very unlikely; and
  - Extremely unlikely.

To determine the significance of the identified impact/risk, the consequence is multiplied by probability. This approach incorporates internationally recognised methods from the IPCC (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity. The significance is then rated qualitatively as follows against a predefined set of criteria (i.e. probability and consequence):

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
  - High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
  - Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks will be ranked as follows in terms of significance:

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

- **Status** - Whether the impact/risk on the overall environment will be:
  - Positive - environment overall will benefit from the impact/risk;
  - Negative - environment overall will be adversely affected by the impact/risk; or
  - Neutral - environment overall not be affected.

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Impacts will then be collated into the EMPr and these will include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Positive impacts will be identified and augmentation measures will be identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts will be evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

6.1. EIA PHASE IMPACT ASSESSMENT

The specialist findings presented in this chapter represents a summary of the detailed and original specialist studies contained in the relevant appendices to this report. The current summary of specialist findings is provided in the interest of brevity and with a view to facilitating public participation; as contemplated in the NEMA principles. The Competent Authority, with its mandate of substantive review of the EIA report, is therefore urged to also read the original specialist studies in the relevant appendices to this report with the aim of discharging its decision-making function. Should any discrepancy occur between this summary, and the relevant detailed specialist study; the detailed specialist study will prevail.

Cumulative impacts have been discussed in each sub-section below for the respective field of study. Figure 6.8 highlights the projects that were considered in the cumulative impact assessments conducted by the specialists (projects within a 20km radius of the proposed Skeerhok Projects).

Note: As the SKA RFI study is not a specialist study as per Appendix 6 of the NEMA EIA regulations (as amended 7 April 2017), but rather a technical report, it is not included in the impact assessment below. The full RFI study and the implications of this proposed project for the SKA is attached as **Appendix P.**

Note: Mitigation and management measures relating to the battery storage activity are described in Appendix O, Section 8. As this is not a listed activity as per Chapter 4, this activity has not been included in the impact assessment below. These measures have further been described in the EMPr.

6.1.1. Ecology and Hydrology

6.1.1.1. Findings of the Ecological Assessment

An assessment of the ecology and hydrology on the proposed site was conducted by SDP Ecological (2018) and attached as **Appendix I**. The findings of this study are discussed below.

6.1.1.1.1. Flora

The Skeerhok PV 1 study site lies to the north of a low elevated ridge which serves to divide the watershed of the two southern PV sites from the more northerly Skeerhok PV 1. Skeerhok PV 1 can be described as a generally level area of land with its highest elevation lying at approximately 1040m above mean sea level (amsl) in the south of the proposed site. The local geology comprises primarily of a mix of sandy soils overlying predominantly dolerite and calcrete geologies with occasional quartzite outcrops.

According to Mucina and Rutherford's veld type classification of 2006, Kenhardt and surrounding regions fall within the Bushmanland Arid Grassland veld type. This veld type is located ostensibly south of the Orange River, but may include a number of smaller habitat forms within its broader extent. The most definitive physical drivers of the Bushmanland Arid Grassland veld type that lies within the study area, are meteorological and will relate to surface and subsurface hydrology . Species were identified and recorded at the points depicted in Figure 6- 1.

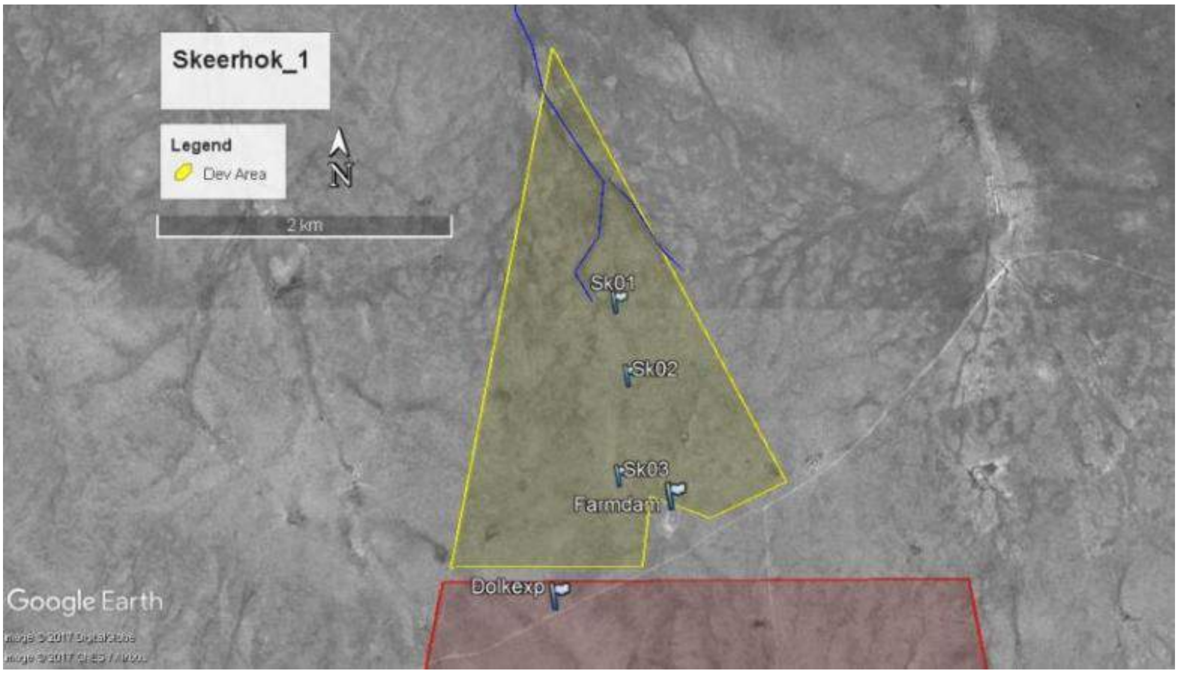

Figure 6- 1: Map indicating ecological sample points within Skeerhok PV 1

In general, the area appears to have been subject to low levels of grazing and has maintained a good cover of grasses, typical of this veld type. The dominant graminoid forms on site are *Aristida junctiformis* and *Stipagrostis ciliata*. The prevailing woody species are primarily *Lyceum* and *Acacia spp* providing some species diversity within the grassland environment. Only limited exotic invasion is evident within the site (primarily *Datura ferox*) with occasional specimens of *Aloe claviflora* being encountered. A list of species identified across site is presented in **Table 1 in Appendix I**. The findings of the study further indicate that there are no specific plant communities across the sample sites, with graminoid species (e.g *Aristida spp*) being evident within most associations. There is however, some indication of associations of more woody species (Acacia spp). This is typical of this grass dominated habitat and supports the contention that the subject site is generally an archetypal example of Bushmanland Arid Grassland with little transformation having been brought about through grazing or other farming activities.

As indicated in the specialist report, there appears to be no significant variation in the distribution of the various vegetation associations across the site. Such results are indicative of the presence of uniform ecological drivers, such as soils, soil depth, elevation and geology, while livestock grazing has probably been maintained at a very low intensity across the site.

6.1.1.1.2. Fauna

A large number of fossorial and burrowing species, including mammals and invertebrates, were identified across the site. Such species included ground squirrel (*Xerus inauris)* and suricates (meerkat) (*Suricata suricata*). Also sporadically present within the site are aardvark (*Orycteropus afer*), as well as the porcupine (*Hystrix africaeaustralis*). Most larger mammals located within the subject site are not reliant upon the study area in particular and are likely to forage over extensive ranges that extend beyond the site boundaries. In some instances, animal intrusions into the PV facilities may prove to be a "risk" to both the animal and the operations of the facility. The foraging activities of aardvark may serve to expose underground cables, while in one instance the striped mouse (*Rhabdomys pumilio*) was noted to be a problem within PV facilities on account of its propensity to establish nests within cable trays and other small enclosures.

Identified during the site reconnaissance was the Bushmanland tent tortoise (*Psammobates tentorius verroxii*), one of three sub species of tent tortoise within South Africa. This relatively small tortoise is not typical of the "tent tortoise family", in terms of its carapace shape and form. Although listed in the IUCN Red List of Threatened Species as 'least concern", the tortoise is generally sparsely distributed across the desert regions of South Africa. Tortoises are the species of terrestrial fauna most likely to be directly affected by the establishment of PV facilities. The presence of electric fencing may also be lethal to tortoises that directly encounter live wires, as the animal withdraws into its carapace to avoid electrocution. Further mortalities may arise during the construction and operation phases, as a consequence of increased vehicular traffic affecting animals both on roadways that lie outside of the site and within construction areas. Reptiles, smaller vertebrates and other invertebrates are also likely to show varying trends in populations across the subject site.

Table 2 in Appendix I indicates species observed on site or evidence of their presence and includes species that are likely to be encountered in the broader region. The occurrence of such species within the site is likely, in respect of these animals either utilizing the site as refugia, or as part of a wider foraging range or territory.

6.1.1.2. Findings of the Hydrological Assessment

Given the absence of definitive geohydromorphic indicators, the major drainage lines within Skeerhok PV 1 have been delineated according to hydrogeomorphological features and an apparent change in vegetation form, from a sparse and arrested growth form, to a more verdant state, associated with drainage. Although short lived, in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can be considered groundwater "recharge zones" in respect of the local subsurface hydrology. From a biotic perspective, the drainage lines do serve as seasonally important refugia and congregation points for inter alia invertebrates (e.g. Class Odonata) and vertebrates (e.g. Order Anura).

Two minor dendritic drainage features are evident in the north of the site (orange lines) (Figure 6- 2), which can be described as shallow, geologically driven channels that may in turn be further excavated by the movement of livestock and in some cases, modification by the farmer. These features show very little evidence of regular flow and are generally identified through the more verdant growth of small woody shrubs such as Acacia spp and Lyceum cinereum. Figure 6- 2 also indicates the position and extent of a more significant dendritic drainage feature (yellow line) that lies to the north of the site and is the confluence of two minor features. The more geomorphologically distinct feature may be considered to be worthy of some level of retention and if the maintenance of free drainage from site is to be pursued, it is suggested that this feature remain generally unimpeded by significant development or transformation. Increasing levels of run off from site that may arise as a consequence of the establishment of the PV facility, even if generally latent in nature, may require that attenuators be placed within these drainage features, should excessive scour arise from a changing surface hydrological regime.

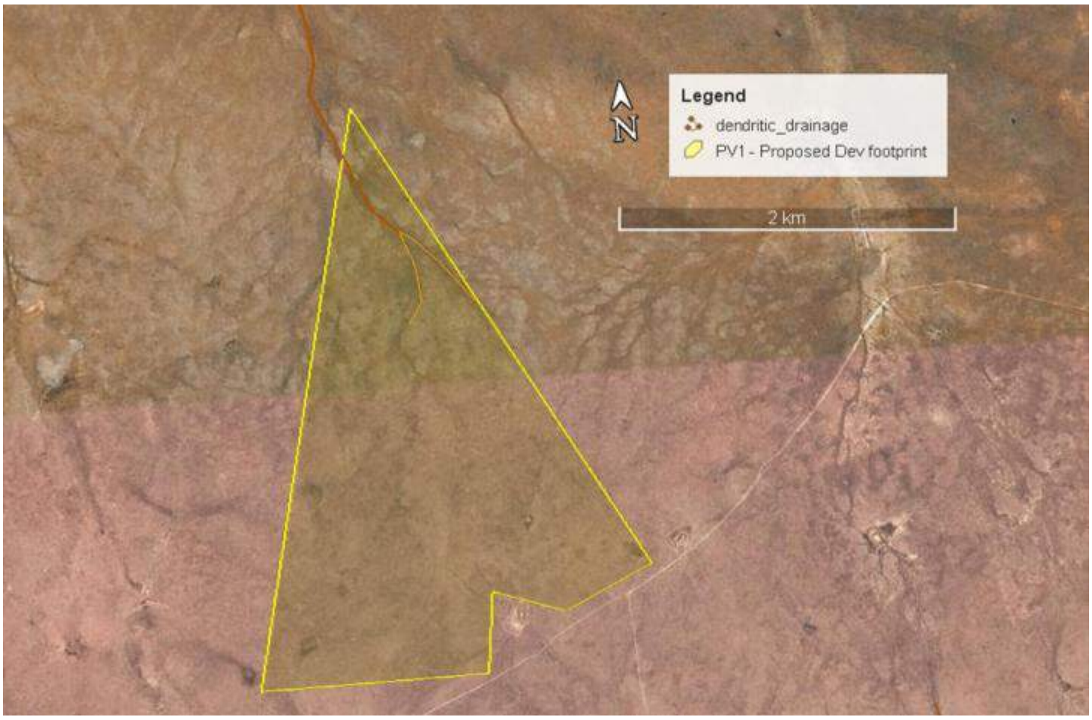

Figure 6- 2: Map indicating the two minor dendritic drainage features lying to the north of Skeerhok PV1

Given the nature of the area as described above, the area that may be considered to be of ecological significance within the site and has been mapped and presented at a spatial level in Figure 6- 3. The area is deemed to be an 'exclusion buffer' from development. The setting aside of this area from development is based purely on the objective of reducing the level of transformation in the prevailing surface drainage regime from the site. <u>No additional sites of ecological significance that should be excluded from the development footprint have been identified.</u> The application of 32 m set back from such features is expected to accommodate both the variation in habitat structure and the erosive action associated with gullies and larger drainage features.

Some impediments to flow may arise at points around roadways or related infrastructure, however this is of limited consequence. In addition, the presence of the modules across the site, generally serves to alter plant-edaphic relationships through the concentration of water at points and increased shading, leading to improved water retention within soils. This situational change has <u>low level ecological ramifications</u>.

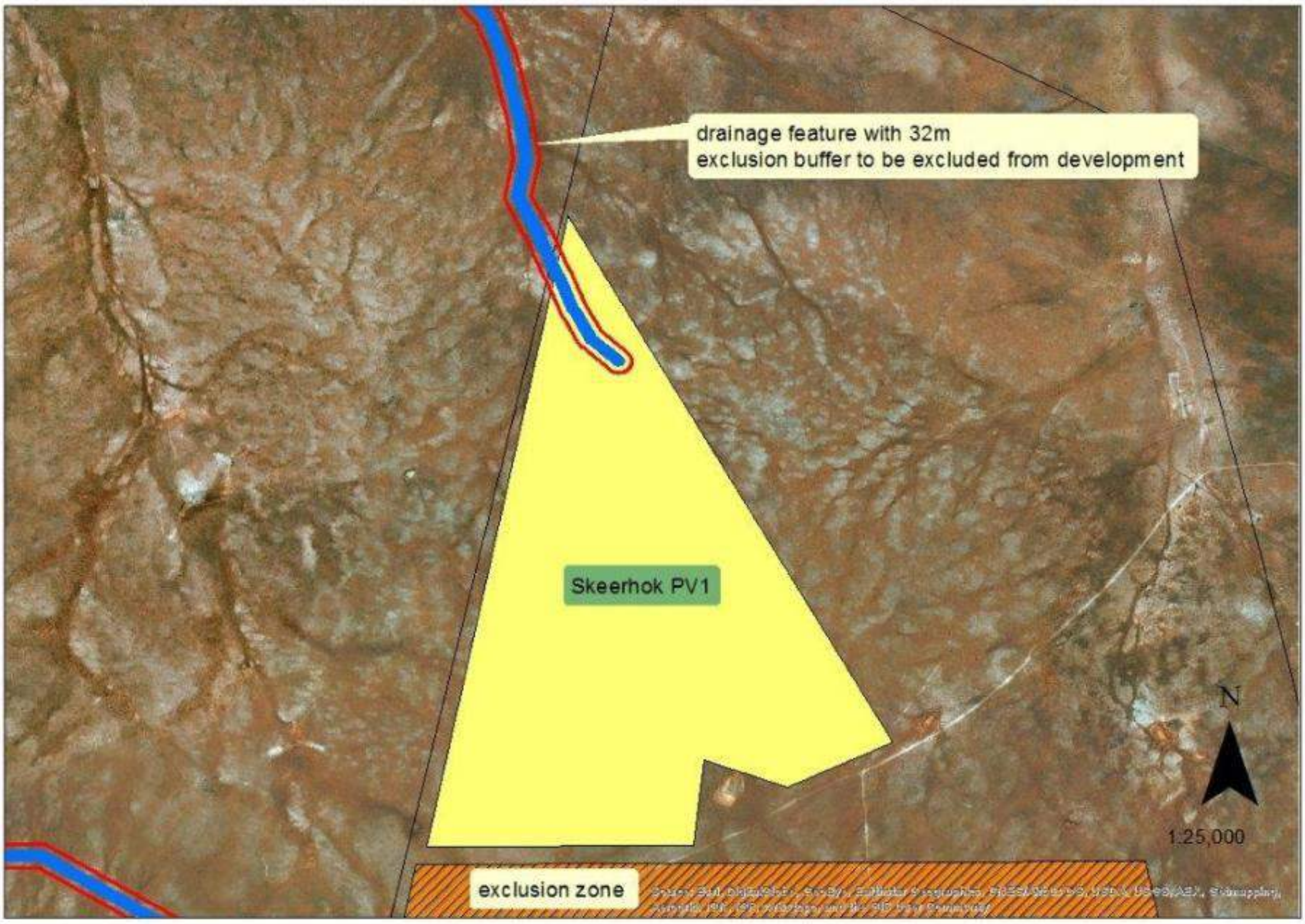

Figure 6- 3: Spatial map of Skeerhok 1 showing "exclusion buffer" around the drainage feature.

6.1.1.3. *Impact Assessment*

Impacts on ecology and hydrology have been described based on the construction, operation and decommissioning phases, as well as the cumulative impacts associated with the proposed project. The proposed development of the PV facility on the study site indicates that the land use change should arise primarily to the south of the site, thus avoiding the drainage features identified to the north. A number of potential impacts have been identified and thoroughly described in **Section 1.5.1 of Appendix I.** These potential negative impacts are summarised below:

Construction Phase

- Alteration of habitat structure and composition;
- Ousting (and recruitment) of various fauna;
- Changes in the geomorphological state of drainage lines (i.e. changes to surface drainage patterns) due to construction activities leading to change in plant communities and general habitat structure, within the site and immediately adjacent to it;
- Increased electrical light pollution, leading to changes in nocturnal behavioural patterns of fauna;
- Exclusion or entrapment of (in particular) large fauna, on account of the fencing of the site;

- Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points;
- Changes in subsurface water resources;
- Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) as a result of construction activities; and
- Exotic weed invasion.

Operational Phase:

- Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as "shading of vegetation" from arrays;
- Ousting (and recruitment) of various fauna on account of long term changes in the surrounding habitat/environment;
- Changes in the geomorphological state of drainage lines on account of long term climatic changes and the concomitant change in the nature of the catchment on account of the land use change;
- Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities. Such changes will be related to the long-term activities on site, but are likely to be negligible; and
- Exotic weed invasion as a consequence of regular and continued disturbance of site.

Decommissioning Phase

- A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise;
- A reversion of present faunal population states within the study area;
- Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment; and
- Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures.

Cumulative

- The "homogenisation of the landscape";
- The increased dissection of habitat;
- The increased presence of exotic and disturbance driven plant species;
- Increased and expanded anthropogenic influences across the region;
- Increased Electrical Light Pollution levels;
- Increased noise pollution levels with concomitant impact on faunal behaviour;
- Vegetation and habitat alteration - change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites;
- Recruitment and behavioural change in fauna - changes in ecological processes and habitat.

The impact assessment for each phase can be seen in the tables below (Table 6- 1):

Table 6- 1: Impact Assessment: Ecology

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE DIRECT IMPACTS													
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	• Detailed design and incorporation of habitat and features • Plant rescue operations • Exotic weed control • Game sweep of site • The maintenance of vegetation and avoidance of the "blading" or clearance. • Consideration of the siting and layout of the temporary construction site and worker camp	Moderate	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Site	Medium-Term	Moderate	Likely	High	Low	• Avoidance of major drainage features during construction • Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible). • Avoidance of significant sculpting of land and maintenance of the general topography of the site • Maintenance of a high level of housekeeping on site during the construction phase. • Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.	Low	Very low	5	High
Abstraction from subsurface aquifers may have a significant impact on plant water relations.	Water volume and ecological change	Negative	Local	Long term	Moderate	Likely	High	Low	Alternative water resources to be utilized	Very low	Very Low	5	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
The introduction of water to site by import may alter the availability of water to plants within the site and may lead to changes in habitat form and structure around areas that receive such import.	Change in plant water relations	indeterminate	Local	Long term	Slight	Likely	High	Low	None identified	Very Low	Very Low	5	High
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	• Avoidance of significant sculpting of land and maintenance of the general topography of site. • Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features.	Very low	Very low	5	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Site	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Low	Low	4	Medium
Increased ELP, leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Moderate	Very likely	High	Low	Reduce level of lighting and placement of lighting to be judiciously considered at time of implementation	Low	Very low	5	High
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Site	Long term	Slight	Very likely	High	Low	• Ensure that the live electrical fence wire is not placed at ground level. • Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence	Very low	Very low	5	High
CONSTRUCTION PHASE INDIRECT IMPACTS													

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local	Long-Term	Substantial	Likely	Moderate	Low	• Detailed design and incorporation of habitat and features • Plant rescue operations • Exotic weed control • Game sweep of site • The maintenance of vegetation and avoidance of "blading" or clearance. • Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Local	Short term	Moderate	Likely	High	Low	• Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible). • Avoidance of significance sculpting of land and maintenance of the general topography of the site. • Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features. • Maintenance of a high level of housekeeping on site during the construction phase. • Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	• Exclusion of major drainage lines from the development footprint. • Avoidance of significant sculpting of land and maintenance of the general topography of site. • Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features. • Maintenance of a high level of housekeeping on site during the construction phase. • Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.	Very low	Very low	5	Medium
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	• Ripping of compact soils when and where extensive compaction arises	Very low	Very low	5	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Increased Electrical Light Pollution (ELP), leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	• Provision of critter paths within fencing should be considered in the design. • Promote and support faunal presence and activities within the proposed PV facility, where applicable.	Very low	Very low	5	High
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Local	Long term	Slight	Likely	High	Low	• Ensure that live electrical fence wire is not placed at ground level. • Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence	Very low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE DIRECT IMPACTS													
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Moderate	Very likely	High	Low	• Provision of critter paths within the fencing should be considered in the design. • Promote and support faunal presence and activities within the proposed PV facility	Low	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very low	N/A	5	High

Changes in meteorological factors at a local scale, on account of the PV array are likely to arise	Uncertainty in relation to change	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very Low	N/A	5	High
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources	Water quantity changes with possible impact on habitat	Negative	Local	Very short term	Substantial	Likely	Moderate	Moderate	• Preferential use of recycled water sources for operational phase requirements (instead of groundwater). • The prudent use of surface water resources. • Adopt "dry" cleaning methods, such as dusting and sweeping the site before washing down. • Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol. • Low level and ongoing cleaning of PV panels over time to reduce demand on aquifers.	Moderate	Low	4	High
Overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behaviour.	Change in animal behaviour	Negative	Local	Long term	Slight	Unlikely	High	Low	None identified	Very low	N/A	5	Medium

The fencing of the site, possibly with electric fencing, is likely to impact on faunal behaviour, leading to the exclusion of certain species and possible mortalities	Animal mortality	Negative	Site	Long term	Moderate	Likely	High	Low	• Ensure that the live electrical fence wire is not placed at ground level. • Conduct regular (daily) inspections of the fence line to address any animals that may be affected by electric the fence.	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE INDIRECT IMPACTS													
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	• Provision of critter paths within the fencing should be considered in the design. • Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High

Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Negative	Local	Short term	Slight	Likely	High	Low	None identified	Very low	N/A	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
DECOMMISSIONING PHASE DIRECT IMPACTS													
A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise;	Habitat and species change	Neutral	Site	Long-Term	Moderate	Very likely	Low	Low	None identified	Low	Not Applicable	4	Medium
A reversion of present faunal population states within the study area	Habitat and species population change	Neutral	Site	Long term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	Medium

Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment;	Surface hydrology change	Neutral	Local	Long term	Moderate	Very likely	High	Low	None identified	Low	Not Applicable	4	Moderate
Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures	Habitat change	Negative	Local - Regional	Long term	Moderate	Very likely	High	Low	Weed control and land management	Moderate	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local to Regional	Long-Term	Substantial	Very likely	Moderate	Low	• Detailed design and incorporation of habitat and features • Plant rescue operations • Exotic weed control • Game sweep of site • The maintenance of vegetation and avoidance of the “blading” or clearance. • Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High

Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Change in drainage patterns and drainage features	Negative	Regional	Long-Term	Substantial	Likely	Low	Moderate	• Exclusion of major drainage lines from development • Avoid sculpting of land • Surface flow energy dissipaters • Maintenance of a high level of housekeeping on site during the construction phase. • Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis	Moderate	Low	4	High
Alteration of surface water quality that leads to change in water chemistry	Changes in drainage patterns and water quality	Negative	Regional	Long term	Moderate	Likely	Moderate	Moderate	• Avoid construction during the rainy season (if possible and practical). • Avoidance of significance sculpting of land and maintenance of the general topography of the site including the avoidance of major drainage lines. • Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features • Apply good site management and solid waste management outside of site (within the immediate vicinity)	Low	Very Low	4	Medium
Changes in sub surface water resources may arise	Effects upon groundwater resources	Negative	Regional	Long term	Substantial	Likely	Moderate	Moderate	• Identify off site water resources • Use of recycled water • Identify or consider alternative cleaning methods for the PV panels	Moderate	Low	4	Medium

Changes in edaphics on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species	Habitat alteration	Negative	Regional	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Low	Very low	5	Medium
Increased ELP	Faunal behavioural change	Negative	Regional	Long term	Slight	Likely	High	Low	Review the placement of lighting on the site.	Very low	Very low	5	Medium
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site	Animal mortality	Negative	Regional	Long term	Slight	Likely	High	Low	• Placement of live wires • Monitoring of fence line	Very low	Very low	5	Medium
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility	Habitat and species loss	Negative	Regional	Long-Term	Substantial	Very likely	Low	Low	• Provision of critter paths within the fencing should be considered in the design. • Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High

Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Exposed soil susceptible to erosion	Negative	Site	Medium-Term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	High
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources.	Changes in water resource quantity and perhaps quality	Negative	Regional	Long term	Severe	Likely	Moderate	Low	• Preferential use of recycled water for operational phase requirements (instead of groundwater). • The prudent use of surface water resources. • Adopt "dry" cleaning methods, such as dusting and sweeping of the site before wash down. • Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol. • Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers.	High	Moderate	3	Medium
As a large area of land will be affected by multiple PV facilities, it is evident that any mortalities and injury associated with electrocution from fencing may be compounded	Cumulative change in faunal populations	Negative	Regional	Long term	Slight	Likely	High	Low	Management of potential sources of electrocution – electric fences	Low	Very low	5	High

6.1.2. Heritage and Palaeontology

6.1.2.1. Heritage (including archaeology)

An assessment of the heritage features of the proposed site was conducted by Jayson Orton (2018) and attached as **Appendix K.** The findings of this study are discussed below.

The primary heritage legislation that needs to be considered is the South African Heritage Resources Act 25 of 1999 and regulations (details at www.sahra.org.za). All heritage material, including burials, is included. Authorisation in terms of the National Heritage Resources Act (NHRA) of 1999 will be required before the development can proceed. Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision.

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The site was then subjected to a detailed foot survey during mid-winter. Seasonality in this part of South Africa, where vegetation is minimal at all times of the year, had no material effect on the fieldwork. The Heritage resources found on site are listed in Table 6- 2 and visually represented in Figure 6- 4.

Table 6- 2: List of findings made during the field survey (Appendix K)

Waypoint	GPS co-ordinates	Site name	Description	Significance (Mitigation)
883	S29 00 01.4 E21 22 55.0	SHK2017/ 001	Quarried quartz outcrop.	Very low
884	S29 00 06.0 E21 23 07.7	---	An area of slightly higher density background scatter alongside a pan. Mixed age material is present. Mostly quartz with some quartzite and occasional CCS. The scatter lies < 20 m outside of the PV footprint.	Very low
885	S29 00 04.9 E21 23 07.2	SHK2017/ 002	A light scatter of LSA quartz artefacts alongside a pan. The scatter lies < 10 m outside of the PV footprint.	Low
893	S28 59 56.2 E21 22 38.5	---	A patch of quartz gravel with many artefacts present as well. Essentially part of the background scatter.	Low
882	S28 59 46.5 E21 23 08.3	---	An area of slightly higher density background scatter. Mostly quartz with some quartzite.	Very low
886	S29 00 20.0 E21 23 10.9	---	An area of slightly higher density background scatter. Mostly quartz with some quartzite.	Very low
887	S29 00 22.8 E21 23 03.2	SHK2017/ 003	A pan that has been excavated out to create a 'dam'. The excavation appears to have penetrated a gravel deposit which has been laid on the sides of the hole to create berms around the 'dam'. Subsequent erosion has led to a lag deposit being present on the berms. This material is mostly gravel but there are many artefacts of mixed age in between. The artefacts include LSA, MSA and ESA, with the latter being the rarest inclusion represented by a few flakes and the distal portion of a hand-axe. Worthy of Grade IIIA, but excavation may yet reveal material worthy of a higher grading.	High
888	S29 00 23.1 E21 23 05.5			
889	S29 00 23.6 E21 23 04.4			
890	S29 00 24.6 E21 23 05.8			
891	S29 00 28.3 E21 23 03.7			
892	S29 00 24.8 E21 23 02.8			

Archaeological resources were found to be very sparsely distributed across the study area with only a few areas found to have artefacts present. None of these was of any significance, since they consisted of either background scatter artefacts or else low density scatters lacking in diagnostic artefacts. There were, however, isolated background scatter artefacts found throughout the study area.

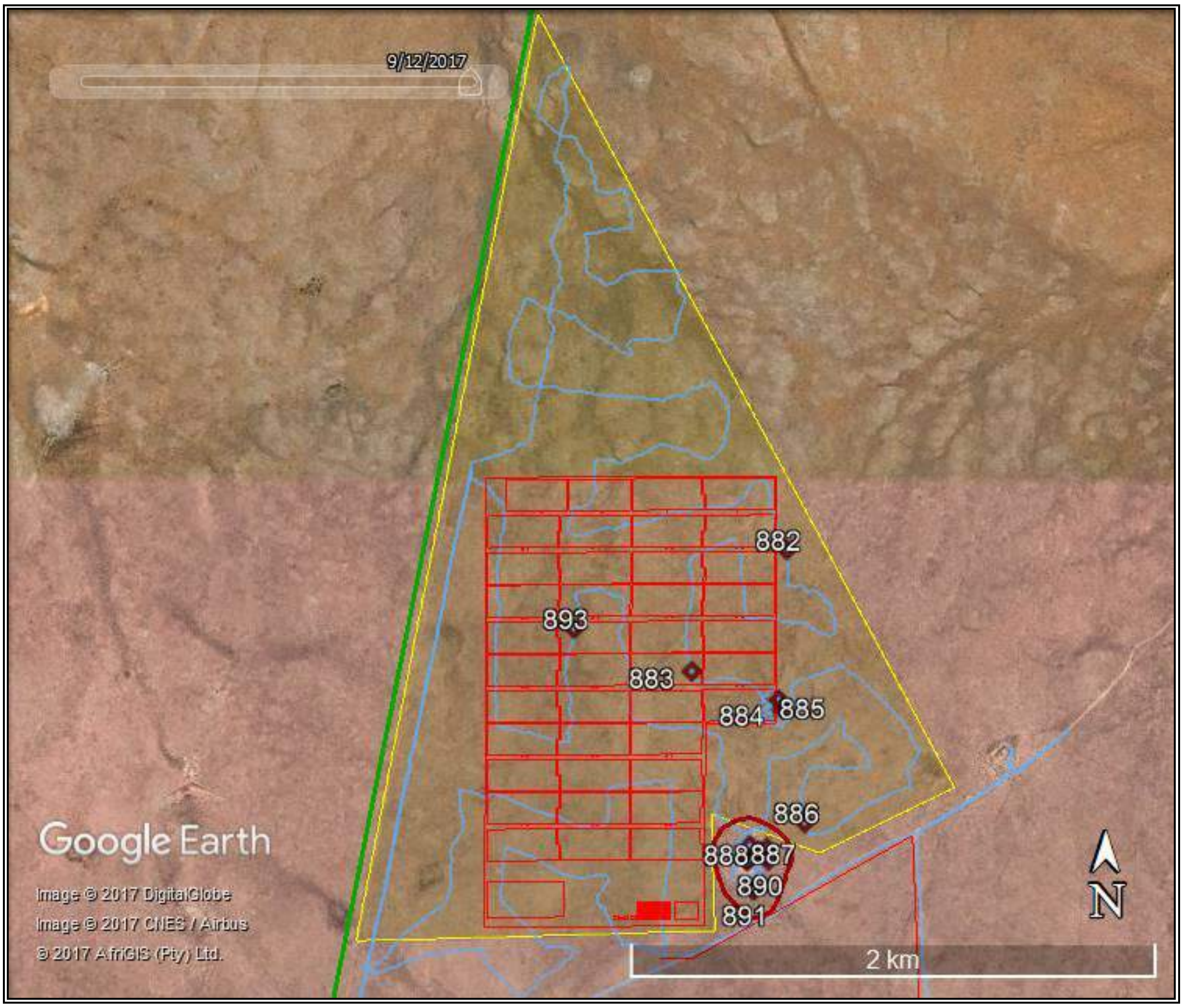

Figure 6- 4: Map showing the distribution of heritage resources (numbered symbols) (HIA, Appendix K)

The cultural and natural landscape is also of concern, however, the cultural landscape is very poorly developed in this area with fences, water troughs and wind pumps being the primary features. The primary sense of place is one of remoteness rather than of a farming landscape. This remoteness has already been impacted upon by the presence of the railway line, Nieuwehoop Substation and all associated power lines. The natural landscape lacks visually interesting and sensitive features. In addition, the proposed site is a long distance from any important roads (it is 11 km from the R27) and is highly unlikely to be visible to anyone other than local residents making use of the gravel road along the railway line. Solar PV facilities are not very tall and, if an earthy coloured paint is used for the buildings where feasible, they can be almost invisible from as little as 1 km away.

6.1.2.2. Palaeontology

A desktop assessment of the paleontology of the proposed site was conducted by John Almond (2017) and attached as an annexure in **Appendix K.**

The region is drained by a dendritic network of shallow, southwesterly-flowing tributary streams of the Hartbeesrivier such as the Rugseersrivier and other unnamed drainage lines. The geology of the study area is shown on adjoining 1: 250 000 geology sheets 2920 Kenhardt and 2820 Upington (Council for Geoscience, Pretoria). Table 6- 3 outlines the fossil heritage recorded from the major rock units that are represented within the Skeerhok PV Solar Energy Facility study area near Kenhardt. The entire area is underlain at depth by a variety of Precambrian basement rocks that are *c*. 2 billion years old and are assigned to the **Namaqua-Natal Province**. These ancient igneous and high-grade metamorphic rocks - mainly granites and gneisses of the **Keimoes Suite** (granitoids) *plus* high grade metasediments of the **Jacobmynspan Group** (*e.g.* gneisses of the **Sandnoute Formation**) – are listed in the legend to Figure 1 in Appendix K. The various basement rock units are described in the Kenhardt and Upington 1: 250 000 sheet explanations by Slabbert *et al.* (1999) and Moen (2007) respectively and are placed in the context of the Namaqua-Natal Province by Cornell *et al.* (2006). They generally crop out as scattered, low surface exposures rather than elevated *koppies*. The Precambrian crustal rocks are transected by the NW-SE trending Boven Rugzeer Shear Zone which trends NW-SE to the southwest of the core solar development study area and will be transected by the associated powerline connection to Nieuwehoop Substation. The shear zone is a band of large-scale tectonic deformation which separates two major crustal blocks in Bushmanland known as the Kakamas Terrane and Areachap Terrane.

Table 6- 3: Fossil heritage recorded from the major rock units that are represented within the Skeerhok PV Solar Energy Facility study area near Kenhardt

GEOLOGICAL UNIT	ROCK TYPES AND AGE	FOSSIL HERITAGE	PALAEONT-OLOGICAL SENSITIVITY
LATE CAENOZOIC SUPERFICIAL SEDIMENTS, ESPECIALLY ALLUVIAL AND PAN SEDIMENTS	fluvial, pan, lake and terrestrial sediments, including diatomite (diatom deposits), pedocretes (*e.g.* calcrete), colluvium (slope deposits such as scree), aeolian sands (Gordonia Formation, Kalahari Group) LATE TERTIARY, PLEISTOCENE TO RECENT	bones and teeth of wide range of mammals (*e.g.* mastodont proboscideans, rhinos, bovids, horses, micromammals), fish, reptiles (crocodiles, tortoises), ostrich egg shells, fish, freshwater and terrestrial molluscs (unionid bivalves, gastropods), crabs, trace fossils (*e.g.* calcretised termitaria, horizontal invertebrate burrows, stone artefacts), petrified wood, leaves, rhizoliths, stromatolites, diatom floras, peats and palynomorphs.	GENERALLY LOW (*e.g.* Tertiary alluvium associated with large old river courses)
Basement granites and gneisses NAMAQUA-NATAL PROVINCE	Highly-metamorphosed sediments, intrusive granites PRECAMBRIAN / MID-PROTEROZOIC (*c*.1- 2 billion years old)	ZERO	ZERO

The desktop study showed that the probability of finding and damaging or destroying significant palaeontological material during development is extremely unlikely. As such, the potential impacts to palaeontology are considered to be very low. The only measure that needs to be put in place is to ensure that the environmental control officer is alerted if any fossil material is found and that such material gets reported to SAHRA. A palaeontologist may need to inspect the find or conduct further research. The impact significance after mitigation remains very low.

6.1.2.3. Impact Assessment

In terms of palaeontology, as described above, it is concluded that both the Precambrian bedrocks and the Late Caenozoic superficial sediments underlying the study area are generally of very low palaeontological sensitivity, although isolated and largely unpredictable, pockets of high sensitivity (*e.g.* mammalian remains) may occur sporadically.

Only one significant heritage resource has been identified in the vicinity of the proposed Skeerhok PV1 development. This is an archaeological site associated with a pan that has in the past been excavated deeper to improve its water catchment ability (Figure 6.5 above and Figure 25, Appendix K). Based on both fieldwork and desktop research as well as the concerns of SAHRA, the potential heritage-related impacts identified during the EIA assessment are:

Construction Phase

- Potential direct impacts to archaeological resources;
- Potential direct impact to palaeontological resources;
- Potential direct impacts to graves;
- Potential direct and visual impacts to the cultural landscape;
- Potential visual impacts to all visually sensitive heritage resources.

Operational Phase

- Potential direct and visual impacts to the cultural landscape;
- Potential visual impacts to all visually sensitive heritage resources.

Decommissioning Phase

- Potential direct and visual impacts to the cultural landscape;
- Potential visual impacts to all visually sensitive heritage resources.

Cumulative impacts

- Potential direct impacts to archaeological resources;
- Potential direct impact to palaeontological resources;
- Potential direct impacts to graves;
- Potential direct and visual impacts to the cultural landscape;
- Potential visual impacts to all visually sensitive heritage resources.

The impact assessment table below (Table 6- 4) shows the impact assessment undertaken for palaeontogy, archaeology and heritage for the proposed Skeerhok PV 1 facility for the construction, operation and decommissioning phases.

Table 6- 4: Impact assessment: Heritage

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION PHASE DIRECT IMPACTS													
Clearing of site and excavation of foundations and construction of the facility	Loss of / damage to archaeological sites	Negative	Site	Permanent	Severe	Very unlikely	Non-reversible	High	Final footprint survey, excavation if needed	Low	Very low	5	High
	Loss of / damage to palaeontological materials	Negative	Site	Permanent	Severe	Extremely unlikely	Non-reversible	High	Chance finds procedure	Very low	Very low	5	High
	Loss of / damage to graves	Negative	Site	Permanent	Extreme	Extremely unlikely	Non-reversible	High	Exhumation process	Very low	Very low	5	Medium
	Impacts to the cultural landscape	Negative	Local	Short term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	Minimise footprint, minimise white-painted surfaces	Low	Low	4	High

Aspect/ Impact pathway	**Nature of potential impact/risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/resource**	**Potential mitigation measures**	**Significance of impact/risk = consequence x probability**		**Ranking of impact/risk**	**Confidence level**
										Without mitigation /management	**With mitigation /management (residual risk/impact)**		
OPERATION PHASE DIRECT IMPACTS													
Presence of the solar energy facility on the landscape and occasional access by maintenance vehicles	Impacts to the cultural landscape	Negative	Local	Long term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	None	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Presence of the solar energy facility on the landscape, frequent access by construction vehicles, creation of dust and landscape scarring	Impacts to the cultural landscape	Negative	Local	Short term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	Minimise work time, Use dust suppression measures	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Clearing of sites, excavation of foundations and construction of the facilities	Loss of / damage to archaeological sites	Negative	Site	Permanent	Severe	Very unlikely	Non-reversible	High	Final footprint survey, excavation if needed	Low	Very low	5	High
	Loss of / damage to palaeontological materials	Negative	Site	Permanent	Severe	Extremely unlikely	Non-reversible	High	Chance finds procedure	Very low	Very low	5	High
	Loss of / damage to graves	Negative	Site	Permanent	Extreme	Extremely unlikely	Non-reversible	High	Exhumation process	Very low	Very low	5	Medium
	Impacts to the cultural landscape	Negative	Local	Short term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	Minimise footprint, minimise white-painted surfaces	Low	Low	4	High

6.1.3. Visual Impact Assessment

6.1.3.1. Findings of the visual impact assessment

The Visual Impact Assessment was conducted by CSIR (2018) and externally reviewed by SiVEST. The results and findings of the study (**Appendix M**) are discussed below.

A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using GIS and a review of existing literature was used to identify and describe landscape elements and character. Potential areas of scenic interest and sensitive visual receptors were also identified. A Viewshed Analysis was also conducted for the surrounding region of the proposed project area and components of the development relevant to the assessment of the potential visual impact (in a 10 km radius) using ArcMap software.

The landscape is characterised as a semi-desert steppe that is sparsely vegetated by grassland with patchy occurrence of low shrubs. The elevation characteristics of the project area are very slight (ranging from ~ 900 m – 1050 m) with an average of slope of 0.5 %, an elevation gain of approximately 27 m on the north-east profile (across 14 km) and 31 m on the east-west profile (across 6 km).

According to the SPOT Building Count there are several buildings/structures within 10 km of the project area. At this stage, these are assumed to be mostly farmsteads and it is possible that existing views from these buildings/structures may be affected by the proposed juwi Skeerhok PV 1 development.

Potential visual receptors that may be impacted by the proposed juwi Skeerhok PV 1 development that have been identified in this desktop investigation mainly include *(if present):*

- National protected/conservation areas;
- Residents of farms in and around the project area;
- Residents of towns within the vicinity of the project area; and
- Road users of the R27, R383 and other access roads in and around the project area.

Based on the distances of the project area from protected areas, tourist and major access routes, and the town of Kenhardt (Figure 6- 5 below) it is unlikely that the views of these potential visual receptors will be significantly adversely affected by the proposed juwi Skeerhok PV 1 development. The greatest risk of visual impact would be to residents of farms in and around the project area. Table 6-5 below describes the potential sensitive visuals receptors and their distance and direction from the proposed juwi Skeerhok PV 1 site.

Table 6- 5: Potential visual receptors that may be impacted by the proposed juwi Skeerhok PV development (Appendix M)

Potential sensitive visual receptor	Distance and direction from project area
Residents of farms in and around the project area	17 structures are seemingly present on the proposed project area, with multiple present within 20 km of the project area. Not all of these structures are necessarily occupied. And discrepancies in the SPOT building count data may also register farm dams or kraals as buildings.

Motorists on other major access - R383	19 km south
Motorists on tourist routes - R27	20 km west
Residents of towns – Kenhardt	26 km south west
Visitors to and residents/staff of protected/conservation areas	48 km north west (Tierberg Nature Reserve)

The juwi Skeerhok PV 1 development is situated within a Renewable Energy Development Zone (REDZ) – specifically the Upington REDZ - which was investigated as part of the SEA for wind and solar photovoltaic energy in South Africa commissioned by the DEA. The SEA included an assessment of the landscape sensitivities of features within REDZ which considered visual, scenic, aesthetic and amenity value. "Landscape sensitivity was determined as part of this study through the identification of natural, scenic and cultural resources which have aesthetic and economic value to the local community, the region, and society as a whole.". The landscape/visual sensitivity of the area where the juwi Skeerhok PV development is proposed, has been classified as having a low sensitivity to solar PV development (**Error! Reference source not found.**, Appendix M).

Based on the findings of the VIA, the following impact drivers/pathways may lead to visual intrusion to the views of sensitive visual receptors:

- Clearance of vegetation for solar field, laydown areas, buildings and roads
- Increased traffic
- Night lighting
- Dust
- Veld fires
- Established infrastructure
- Cumulative effects of the abovementioned impact drivers of all proposed solar PV development in the proposed project area

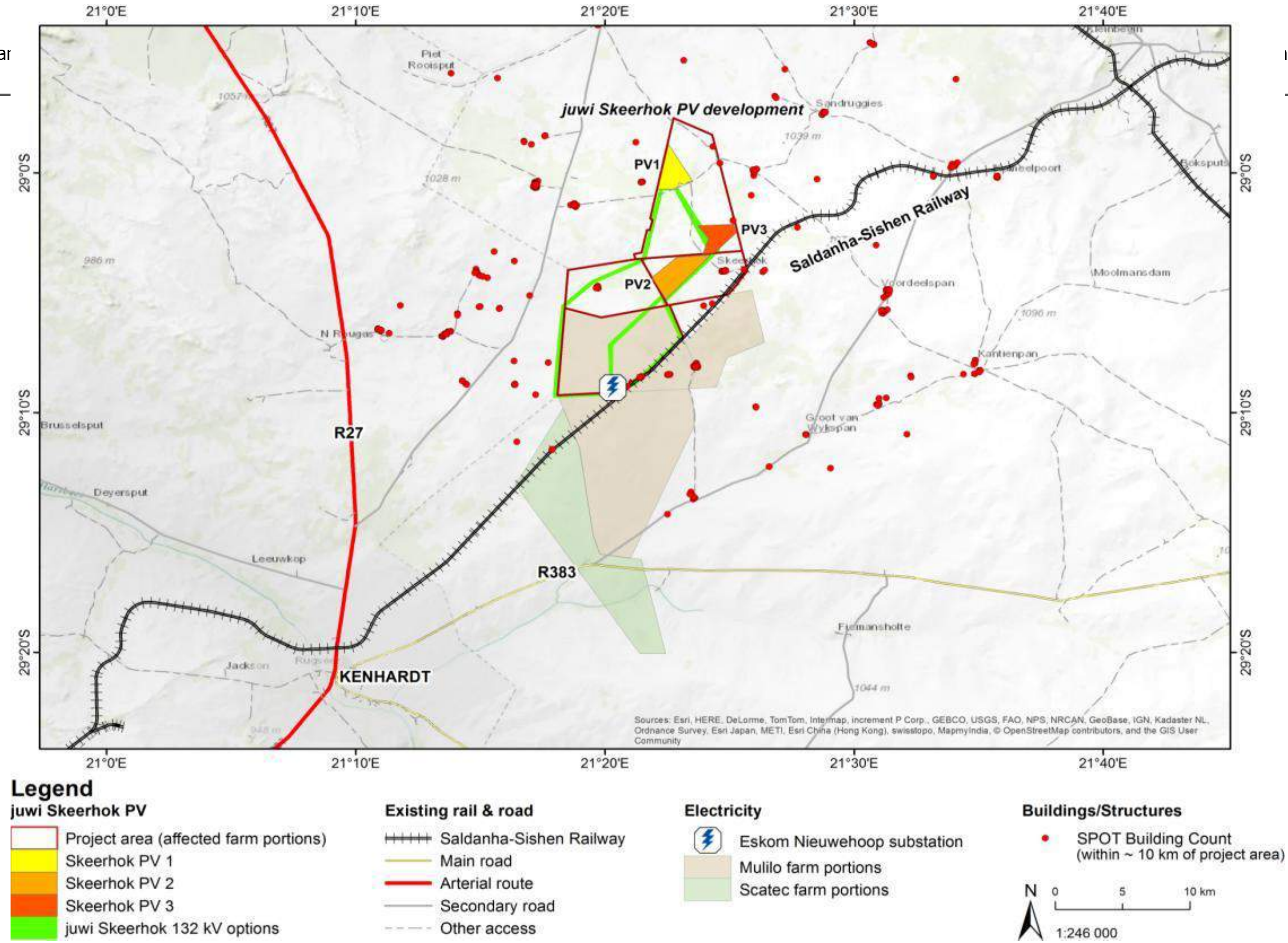

Figure 6-5: Summary of key landscape features and potential sensitive visual receptors in the project area and surrounds.

6.1.3.2. Impact assessment

The changes to the landscape character that may be brought about by the proposed Skeerhok PV 1 development can have impacts on the views of potential sensitive visual receptors. However, the existing approvals for solar PV developments and the construction of high-voltage electricity infrastructure in the direct surroundings of the project area have established a new status quo industrial/electrical landscape character. As such, the potential risks to sensitive visual receptors have been extensively investigated during the EIA processes for the Mulilo and Scatec solar PV developments.

Key impact drivers that may intrude the views of sensitive visual receptors are presented in Table 6- 6 below.

Table 6- 6: Key project aspects may result in impacts to the views of sensitive visual receptors and the associated project phase (Appendix M)

Impact	Impact pathway/driver	Project phase		
		Construction	Operation	Decommissioning
Visual intrusion to the views of sensitive visual receptors	Clearance of vegetation for solar field, laydown areas, buildings and roads	X		X
	Construction/decommissioning activities (all infrastructure, incl. roads, substations and transmission lines)	X		X
	Increased traffic	X	X	X
	Night lighting	X	X	X
	Dust	X		X
	Veld fires	X		X
	Established infrastructure		X	
	Cumulative effects of the abovementioned impact drivers of all proposed solar PV development in the proposed project area	X	X	X

The impact assessment table below shows a detailed VIA as per Appendix M for the construction, operation and decommissioning phases of the proposed project (Table 6- 7).

Table 6- 7: Impact Assessment: Visual

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION PHASE DIRECT IMPACTS													
Clearance of vegetation for solar field, laydown areas, buildings and roads	Visual intrusion to views sensitive of visual receptors	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	- Minimise the footprint of cleared vegetation. - Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure. - Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. - Commence with restoration of disturbed, cleared land as soon as possible. - Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use. -	**Low**	**Very Low**	5	High
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	- Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	- Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and - appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	**Nature of potential impact/risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/resource**	**Potential mitigation measures**	**Significance of impact/risk = consequence x probability**		**Ranking of impact/risk**	**Confidence level**
										Without mitigation /management	**With mitigation /management (residual risk/impact)**		
OPERATION PHASE DIRECT IMPACTS													
Increased traffic	visual intrusion to views sensitive of visual receptors	Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak. - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only.	**Moderate**	**Low**	4	High
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE DIRECT IMPACTS													
Established infrastructure		Negative	Local	Long-term	Moderate	Very Likely	Moderate	Low	- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures. - Maintain painted features and repainted when colours fade or paint flakes. - Choose materials, coatings and paints with minimum reflectivity where possible. - Paint grouped structures the same colour to reduce colour contrast. - Construct powerline towers to be similar to those already existing in the landscape, where possible.	**Moderate**	**Moderate**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Clearance of vegetation for solar field, laydown areas, buildings and roads	Visual intrusion to views sensitive of visual receptors	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	- Minimise the footprint of cleared vegetation. - Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure. - Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. - Commence with restoration of disturbed, cleared land as soon as possible. - Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time. - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use.	**Low**	**Very Low**	5	High
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	- Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	- Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and - appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Cumulative Impacts	Visual intrusion to views sensitive of visual receptors	Neutral	Regional	Long-term	Moderate	Very Likely	High	Low	➢ Adequate implementation of proposed mitigation measures and best practice to reduce visual impacts by all solar PV facilities in the vicinity.	**Moderate**	**Moderate**	4	High

6.1.4. Avifauna (birds)

6.1.4.1. Findings of the bird impact assessment

The bird assessment was conducted by Mr. Jon Smallie (2017) to evaluate the impact on birds from the proposed Skeerhok PV1 facility. This report is attached as **Appendix J.**

This arid area is home to several large terrestrial bird and raptor species, the most important of which are Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Secretarybird *Sagittarius serpentarius*, Karoo Korhaan *Eupodotis vigorsii,* Verreaux's Eagle *Aquila verreauxii* and Martial Eagle *Polemaetus bellicosus*. In addition to being classified as threatened regionally and in some cases globally, most of these species are facing significant threats to their survival from existing impacts in the arid parts of South Africa. In addition, this area is home to an assemblage of arid zone adapted smaller bird species including larks, sparrow-larks, chats and others. Most important of these from a conservation perspective are Red Lark *Calendulauda burra* and Sclater's Lark *Spizocorys sclateri*, both of which are listed as regionally threatened species (Vulnerable and Near-threatened respectively), have very restricted ranges and have been recorded in the broader area within which the study area is situated. Stark's Lark *Spizocorys starki* is also an important endemic present in the area, and Burchell's Courser *Cursorius rufus* (Vulnerable) is a nomadic species which occurs in the broader area.

For the purposes of the bird study (Appendix J) two specialist site visits and three seasons of on-site bird monitoring was conducted, in accordance with the best practice guidelines. The proposed project falls under Regime 2 on account of being of 'medium' avifaunal sensitivity and greater than 150ha in extent. This means it requires two to three site visits of 3 to 5 days duration each over 6 months. <u>3 x 4 day site visits were conducted thereby slightly exceeding the minimum requirements</u>. The following findings were made with respect to avifauna[1]:

- The surveys on site took place in a slightly above average rainfall year (165.0mm in 2017 c.f. 147.8mm p.a. mean since 1960). This resulted in the data being representative of typical conditions on site.
- The proposed Skeerhok PV 1 site is already relatively impacted by linear infrastructure including roads, railway line, and transmission and distribution power lines.
- There are no Important Bird & Biodiversity Areas close to the proposed site.

<u>Key sightings:</u>

- Walked transects on site recorded 29 small passerine bird species in total. Twenty of these species are either endemic or near endemic to southern Africa, which is a very high level of endemism. Whilst the most abundant species on site were all common species, and important endemic, Stark's Lark *Spizocorys starki* was also recorded in relatively high abundance on site. No regionally Red Listed species were recorded on site by this method.
- Driven transects on site recorded 6 priority species. Two were small passerines, Red Lark *Certhilauda burra* (Vulnerable -1 individual), and Double-banded Courser *Rhinoptilus africanus*. The 4 remaining species were: Kori Bustard *Ardeotis kori* (Near-threatened), Ludwig's Bustard *Neotis ludwigii* (Endangered), and Northern Black Korhaan *Afrotis afraoides*. Three of these species are regionally Red Listed as indicated above. These are graphically depicted in Figure 6- 6 below.

[1] Full species lists and a greater explanation of each finding can be found in Appendix J

- Martial Eagle *Polemaetus bellicosus* (Endangered) was recorded several times off site, approximately 9km to the west. Although these birds are suspected to breed somewhere in that area (no nest was located) this is too far from the proposed site to be of concern.
- A total of 57 bird species were recorded on site during the monitoring programme by all methods and incidentally. Thirty of these are endemic or near-endemic. This included 5 regionally Red Listed species, the 4 mentioned above already and Karoo Korhaan *Eupodotis vigorsii* (Near-threatened). Sclater's Lark *Spizocorys sclateri* and Burchell's Courser *Cursorius rufus* were not recorded on site during this programme, but are considered likely to visit the site occasionally when conditions are right (see Appendix J for species list).
- Considering the bird and habitat data collected on site it is concluded that the following species will be most at risk if the proposed development goes ahead:
  - Ludwig's Bustard;
  - Kori Bustard;
  - Karoo Korhaan;
  - Red Lark;
  - Sclater's Lark; and
  - Stark's Lark.

There are many more endemic but not Red Listed species which will also be of concern, however, the specialist deemed the above suite of species a good surrogate for those more common species in terms of impact assessment and management.

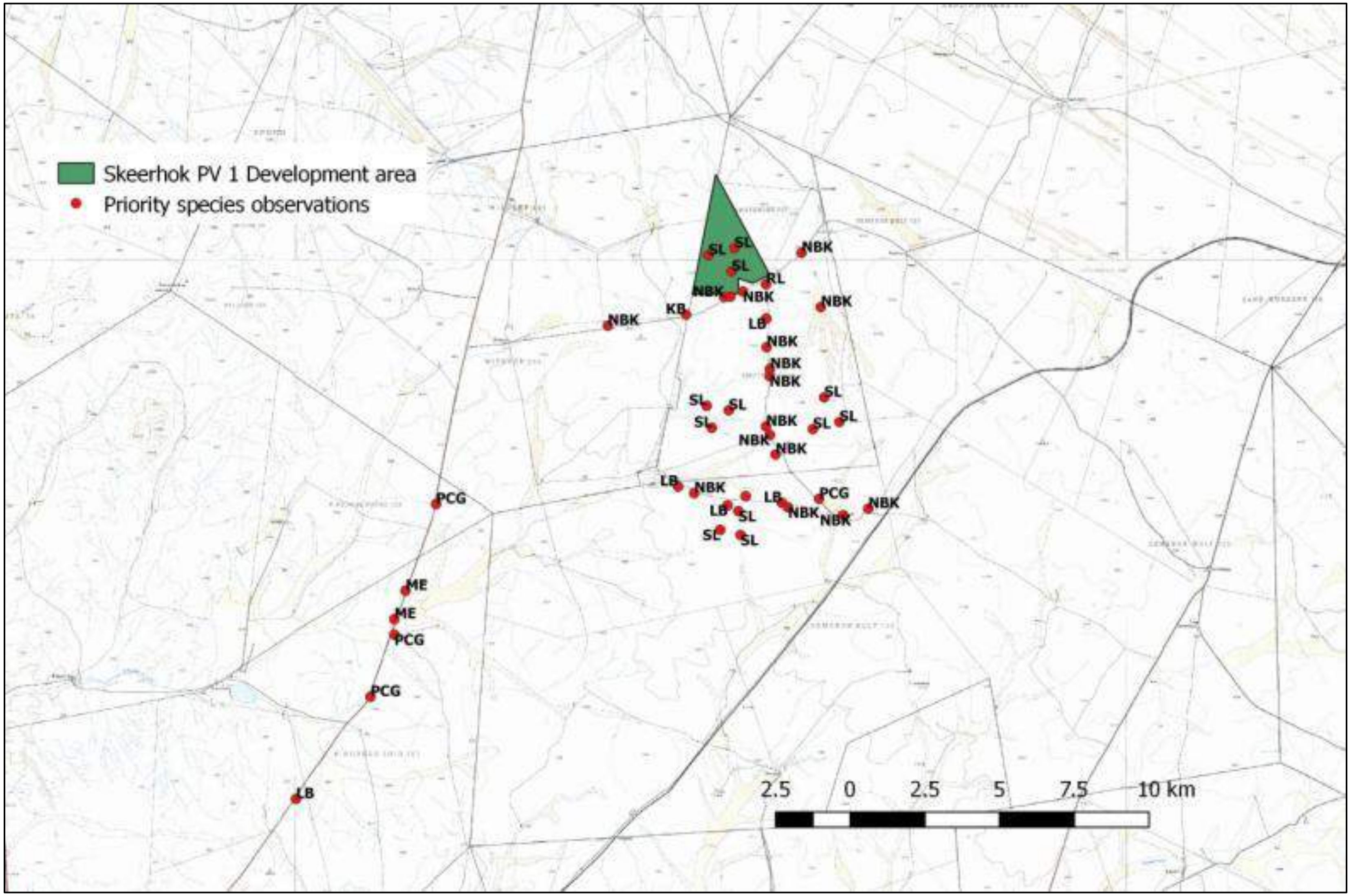

Figure 6- 6: Location of all priority species records across all monitoring methods. LB – Ludwig's Bustard; PCG - Pale Chanting Goshawk; ME – Martial Eagle; NBK – Northern Black Korhaan; KB – Kori Bustard; SL – Stark's Lark (Appendix J)

6.1.4.2. Impact assessment

The effects of any development on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and diversity of birds present. A summary of the assessment of the significance of the impacts on avifauna on site is as follows:

- Habitat destruction during the construction phase will be of HIGH significance, mitigated to MODERATE significance.
- Disturbance of birds during the construction phase will be of LOW significance.
- Bird fatalities at the facility during the operational phase (mostly through collision with infrastructure) will be of MODERATE significance, mitigated to LOW.
- Nesting of birds on the facility infrastructure during the operational phase will be of LOW significance.
- Altered surface water runoff on site during the operational phase will be of LOW significance.
- Chemical pollution due to panel cleaning during the operational phase will be of LOW significance.
- Disturbance of birds during the construction phase will be of LOW significance.

In terms of cumulative impacts, the construction of multiple additional facilities will result in the overall cumulative impact being HIGH negative. The cumulative impact assessment assumes the worst case scenario of up to 14 solar facilities being constructed in this 20km radius. However, if as per the DEA statement, only 6 are built, this would reduce the significance of the impacts by approximately half. This would probably result in the significance being rated as MODERATE rather than the current HIGH.

The table below describes the various potential impacts that could occur as a result of the proposed facility for the construction, operational and decommissioning phases as well as cumulative impacts (Table 6- 8).

Table 6- 8: Impact assessment: Avifauna

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION PHASE IMPACTS													
Clearing of vegetation	Habitat loss/alteration	Negative	Site	Permanent	Substantial	Definite	Low	Moderate	- Water courses, drainage lines, streams and wetlands should be avoided and a no go buffer of 100m be applied around them. - Dams and livestock water points should likewise be avoided with a 100m no go buffer. - Rocky outcrops should be avoided with a 100m no go buffer. - All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. - Care should be taken not to introduce or propagate alien plant species/weeds during construction.	High	Moderate	1	High
General construction activities	Disturbance	Negative	Local	Short term	Moderate	Probable	High	Moderate	- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed. - Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility.	Low	Low	2	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE IMPACTS													
Operation of facility	Bird fatalities	Negative	Site	Long term	Moderate	Probable	High	Moderate	- The more sensitive habitat areas of the site should be avoided. A buffer area has been identified around all farm dams (of 100m) within which no PV panels or other above ground infrastructure should be built. - The PV panels should spend as little time as possible time in a vertical position since this presents a greater collision hazard. - Post construction monitoring programme is recommended for this site - Mitigation must be applied reactively once the facility is operational, only if a significant problem is detected. - Monitoring of this infrastructure for bird fatalities should be built into the operational environmental management plan for the facility.	Moderate	Low	1	Low

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE IMPACTS													
Operation of facility	Nesting of birds	Positive	Site	Long term	Slight	Probable	High	Low	- None required for the impact of the facility on birds. For the impact of the birds nesting on the facility, we recommend nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation. - We recommend that the operational phase EMP include provision for application to the provincial authority for permits for any necessary nest management.	Low	Low	3	High
Operation of facility	Altered water runoff	Negative	Local	Long term	Slight	Probable	High	Low	- This will need to be managed through the development of a carefully considered surface water/drainage management plan for the site.	Low	Low	2	Low
Operation of facility	Chemical pollution	Negative	Local	Long term	Slight	Probable	High	Low	- The surface water management plan should stipulate the use of environmentally friendly and acceptable cleaning products.	Low	Low	4	Low

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE IMPACTS													
Decommissioning activities	Disturbance	Negative	Local	Short term	Moderate	Probable	High	Moderate	- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed. - Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility.	Low	Low	1	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	l Exten	Durati on	Conse quenc	Proba bility	sibilit y of	receiv ing	Potential mitigation measures	Significance of impact/risk = consequence x probability	ng of impac	Confi dence

										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Cumulative displacement of species as a result of habitat loss or transformation	Habitat loss and disturbance	Negative	Regional	Permanent	Substantial	Definite	Low	Moderate	- See section 3.7 in Appendix J for detailed explanation and recommendations.	High	Moderate	1	High

6.1.5. Traffic (Impact Statement)

The purpose of the Traffic Impact Statement (Appendix N2) was to investigate the traffic impact of the proposed development on the surrounding road network and to propose mitigating measures if required. The impact statement has been compiled by the CSIR using existing information and reviewed by Mr. Christo Bredenhann Pr. Eng, a qualified Traffic and Transportation Engineer. The studies used as a reference for this impact statement are listed in Section 7 of Appendix N.

During all phases (construction, operation and decommissioning) of the project, additional traffic will be generated. The highest traffic volumes will be created during the construction phase. This includes activities associated with:

- Site preparation and transporting the construction materials and associated infrastructure to the site; and
- Transportation of employees to and from the site on a daily basis.

The proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes will be considered in the design of the facility and have been included in the proposed project. The R27 extends from Keimoes (in the north) to Vredendal in the south. The R27 is a 6 m wide surfaced road with 1 lane per direction and unsurfaced shoulders. It has a 45 m road reserve. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The Transnet Service Road can be accessed from the R27. The existing gravel road can be accessed from the R383 Regional Road also via the R27 National Road. The Transnet Service Road and unnamed farm road are both 7-8 m wide, however in certain sections, the unnamed farm road is believed to be about 2-3 m wide. It is currently proposed that existing roads will be used as far as possible, to avoid the construction of new roads for the proposed Skeerhok PV 1 facility.

The traffic generation estimates were based on similar studies conducted within the study area. The estimated traffic generated includes the Scatec Kenhardt project and the Skeerhok PV 1, 2 and 3 projects. The generated traffic for the Skeerhok PV 1 project is anticipated to be similar to the Scatec Kenhardt projects.

For the construction, operational and decommissioning phases, the load estimations were regarded as negligible traffic (Section 4.2, Appendix N2). It is also further emphasized that a full Traffic Impact Assessments (TIA) are normally only required for developments that will generate more than 50 vehicle trips (In + Out) during any peak hour.

6.1.5.1 Impact Assessment

Historic traffic volume figures are not available within the study area; however, the resultant traffic volumes has been assumed to be below the allowed maximum average daily traffic limit of 1000 veh/day. Although the proposed development is expected to generate trips during the construction, operation and decommissioning phases, the traffic generated will be low, based on similar studies conducted within the study area.

The traffic impacts that are likely to be generated by the proposed facility are detailed below. The impacts will largely occur during the construction phase of the project, since this is when the highest amount of traffic will be generated by the proposed facility.

As per the impacts table below (Table 6- 9), the impacts identified and assessed as part of the reference studies are:

- Increase in traffic generation.
- Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.
- Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment.
- Decrease in quality of surface condition of the roads.
- Cumulative impact of traffic generation of all six projects in the area, including Skeerhok 1 to 3. The cumulative impact during the construction and decommissioning phases of all 6 projects cannot be assessed, as it is unlikely that all projects will be constructed or decommissioned over the same periods (see Table 1.2 in Appendix N2 for the cumulative daily traffic generation estimates).

Table 6- 9: Impact assessment: Traffic

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION AND DECOMMISSIONING PHASE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Short term	Moderate	Very likely	Yes	Replace-able	• A permit should be obtained from the PGNC Department of Public Works, Roads and Transport for any abnormal loads transported. • Provide a Transport Traffic Plan to SANRAL and the PGNC Department of Public Works, Roads and Transport. • Road and safety standards should be adhered to.	Low	Low	4	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Short term	Moderate	Likely	No	High Irreplaceability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences (such as Animex fences) installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. • Implement clear and visible signage at access to site at R27 and Transnet Service Road intersection.	High	Moderate	3	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles. • Postpone or reduce dust-generating activities during periods with strong wind. • Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased. • Ensure that all construction vehicles are roadworthy and adhere to vehicle safety standards implemented by the Project Developer. • Avoid using old and noisy construction equipment and ensure equipment is well maintained.	Moderate	Low	4	Medium
Traffic generation	Change in quality of surface condition of the roads	Negative	Local	Short term	Slight	Likely	Yes	Replace-able	• Construction activities will have a higher impact than the normal road activity and therefore the road should be inspected on a weekly basis for structural damage; • A Road Maintenance Plan should be developed for the section of the Transnet Service Road that will be used to addresses the following: o Grading requirements; o Dust suppressant requirements; o Drainage requirements; o Signage; and o Speed limits.	Low	Low	4	Medium

Aspect/ Impact pathway	**Nature of potential impact/risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/resource**	**Potential mitigation measures**	**Significance of impact/risk = consequence x probability**		**Ranking of impact/risk**	**Confidence level**
										Without mitigation /management	**With mitigation /management (residual risk/impact)**		
OPERATIONAL PHASE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; • Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Long term	Moderate	Likely	No	High irreplaceability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences (such as Animex fences) installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. • Implement clear and visible signage at access to site at R27 and Transnet Service Road intersection.	High	Moderate	3	Medium
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; • Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE IMPACTS													
	Change in quality of surface condition of the roads	Negative	Local	Long term	Slight	Likely	Yes	Replace-able	• Implement requirements of the Road Maintenance Plan.	Low	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; • Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Long term	Moderate	Likely	No	High irreplaceability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. • Due to negligible traffic increases, increase in accidents is minimal.	Moderate	Low	3	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; • Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

6.1.6 Social (Impact Statement)

The purpose of the Social Impact Statement (**Appendix N3**) was to review the existing information contained in the reference studies that were conducted for Solar PV developments in the Kenhardt area (see reference list in Section 7, Appendix N). The Social Impact Statement as compiled by the CSIR and externally reviewed by Applied Science Associated (Pty) Ltd (2018). The SIAs used as reference for the statement consulted secondary data sources (published documentation) to obtain basic socio-economic baseline demographics. This secondary data was then augmented with primary data generated by a site visit to the proposed project site as well as the town of Kenhardt.

The major social challenges faced in the Kai !Garib Municipal area include:

- Increases in drug abuse;
- Increases in children under 10 years abusing alcohol;
- Increases in teenage pregnancies;
- Increased crime linked to alcohol and drug abuse;
- High youth unemployment rates; and
- Increased prevalence of HIV & AIDS.

The Kenhardt community appears to have acceptable access to both Human and Social capital. Informants reported that community members are generally in very good health and that most young adults have a secondary education. The high level of unemployment and the increasing number of teenage pregnancies present in Kenhardt requires robust social capital to prevent affected community members from falling into abject poverty. The relative success of the local community in preventing this, suggests that access to social capital is satisfactory.

Access to physical capital in Kenhardt seems average to low. The community has access to bulk services (water, electricity and waste collection), and a range of housing types ranging from formal to informal. Transport is not a significant factor within Kenhardt, due to its very small size; however, access to other urban areas (e.g. Keimoes, Kakemas and Upington) is limited to private transport. Informants also indicated that access to information and awareness of basic rights and public services are very low. Natural capital in Kenhardt is limited due to the harsh climatic conditions and general lack of irrigation water. As a result, community members appear to have limited access to productive natural assets. Finally, access to financial capital is very limited as the bulk of the vulnerable section of the Kenhardt community seems to be dependent on government subsidies and pensions.

6.1.6.1 Impact Assessment

By far the most significant driver of change likely to result from the proposed project is the influx of job seekers into the Skeerhok PV 1 study area, and the corresponding increase in spending and employment. Such an influx of “strangers” into the receiving environment is likely to cause a disturbance in the order of the existing social structure and might also lead to increases in social deviance. Increased spending and employment (even though such employment might be short-term) generates positive impacts through the multiplier effect and by providing much needed financial relief in the area. However, it also creates significant, and often unrealistic, expectations regarding potential employment. The table below (Table 6- 10) summarizes the impacts from each phase that are anticipated or expected to occur due to the proposed Skeerhok PV 1 Project.

Table 6- 10. Impact assessment: Social

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND OPERATION PHASE IMPACTS													
Influx of job seekers into the Kenhardt area	Disruption of existing social structures	Negative	Local	Medium to Long-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan	Moderate	Low	4	Medium
Outsiders moves into the Kenhardt area	Increases in social deviance	Negative	Local	Medium-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan • Delivery on the Economic development Plan must be contractually binding on the proponent	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Expectations created regarding possible employment	Increased frustration in the local community	Negative	Local	Short-term	Moderate	Likely	High	Moderate to low	• Develop and implement the Stakeholder Engagement Plan	Low	Very low	5	Medium
Local spending	Socio-economic benefits as a result of the multiplier effect	Positive	Local	Medium to long-term	Moderate	Likely	n/a	n/a	• Procure goods and services, where practical, within the study area • Obtain regularly required goods and services from as large a selection of local service providers as possible	Low	Low	4	Medium
Local employment	Socio-economic benefits	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• Develop and implement a Workforce Recruitment Policy	Moderate	Moderate	3	High
Economic Development Plan	Contribute to local employment, local spending and human capacity development	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• The proponent should engage with local NGOs, CBOs and local government structures to identify and agree upon relevant skills and competencies required in the Kenhardt community • Such skills and competencies should then be included in the Economic Development Plan • Where possible, align Economic development Plan with Local Municipality's IDP	Moderate	Moderate	3	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
DECOMMISSIONING PHASE IMPACTS													
Decommissioning of the proposed development	Job losses	Negative	Local	Long-term	Substantial	Very likely	Moderate	Moderate	• The proponent should comply with relevant South African labour legislation when retrenching employees • juwi should also implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning • All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse	Moderate	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CUMULATIVE IMPACTS													
Exacerbated in-migration	Disruption of social structures	Negative	Local	Medium to long-term	Substantial	Likely	Low	Moderate	n/a	Moderate	N/A	3	Medium

6.1.7 Soils and Agricultural Potential (Impact Statement)

The purpose of the Soils and Agricultural Potential Impact Statement (**Appendix N1**) was to review the existing information contained in the reference studies that were conducted for Solar PV developments in the Kenhardt area (see reference list in Section 7, Appendix N). The Impact Statement was compiled by the CSIR and externally reviewed by Mr. Johann Lanz (2018). The impacts on agricultural potential and soils of the proposed development have been identified in the table below and mitigation measures have been proposed (see further mititgation measures in the EMPr).

The proposed development is located on level plains with some relief in the Northern Cape interior at an altitude of between 900 and 1000 meters. Slopes across the site are almost entirely less than 2%. The underlying geology is migmatite, gneiss and granite of the Namaqualand Metamorphic Complex with abundant calcrete. There are no perennial drainage courses within the proposed Skeerhok PV 1 project area. There are temporary drainage courses, typical of arid environments, where surface run-off would accumulate and flow, but this would only occur very occasionally, immediately after high rainfall events.

Due to both the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. The site is within one of South Africa's eight proposed REDZs, and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors. These factors include an assessment of the significance of the loss of agricultural land. Renewable energy development is therefore a very suitable land use option for the site.

6.1.7.1 Impact Assessment

The proposed developments are located on land zoned and used for agriculture. South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of land that may be valuable and important for agricultural production. The proposed site is however on land which has very low agricultural potential and is only suitable for low intensity grazing.

All impacts are evaluated in terms of their consequence for agricultural production, not in terms of the impact *per se*. This is because it is agricultural production that must be the focus of an agricultural assessment. Because the undisturbed site already has extremely limited agricultural potential, it means that the consequence of any impact for agricultural production is limited with the result that the consequence and significance of agricultural impacts is low. Furthermore, the poor, very shallow soil conditions reduce the significance of loss of topsoil and the low slope gradients reduce the significance of potential erosion impacts. Irreplaceability of resources is considered low because the resource that is being impacted is non-arable, low potential grazing land which is not a scarce resource in the country. The confidence level of the assessment is considered high because there is certainty about the low agricultural potential of the land and the impacts are fairly easy to understand and predict. There are a large number of other potential projects in the area that will also lead to a loss of agricultural land. Although the loss of individual project portions of land has low significance, as discussed above, the cumulative impacts of land loss regionally becomes more significant. However, despite this cumulative impact, it is still agriculturally strategic from a national perspective to steer as much of the country's renewable energy development as possible to regions such as this one, with very low agricultural potential. It is preferable to incur a higher cumulative loss in such a region, than to lose agricultural land with a higher production potential elsewhere in the country.

Impacts and mitigation measures are described in the table below (Table 6- 11). Recommendations for the monitoring and review of all identified mitigation measures are described below, as well as the EMPr.

Table 6- 11. Impact assessment: Soils and agriculture

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND DECOMMISSIONING PHASE DIRECT IMPACTS													
Vehicle traffic and dust generation	Veld degradation	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Minimize footprint of disturbance. • Confine vehicle access on roads only. • Control dust generation during construction and decommissioning activities by adopting standard construct site dust control methods (such as dampening surfaces with water), where required. Because of water scarcity, this should only be done where and when dust generation is a significant problem.	Very Low	Very Low	5	High
Constructional and decommissioning activities that disturb the soil profile.	Loss of topsoil	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Strip and stockpile topsoil from all areas where soil will be disturbed. • After cessation of disturbance, re-spread topsoil over the surface. • Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION, OPERATION AND DECOMMISSIONING PHASE DIRECT IMPACTS													
Occupation of the land by the project infrastructure	Loss of agricultural land use	Negative	Site	Long term	Slight	Very Likely	High	Low	• None	Very Low	Not applicable	5	High
Constructional and decommissioning activities that disturb the soil profile.	Loss of topsoil	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Strip and stockpile topsoil from all areas where soil will be disturbed. • After cessation of disturbance, re-spread topsoil over the surface. • Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND DECOMMISSIONING PHASE INDIRECT IMPACTS													
Change in surface characteristics and surface cover.	Erosion	Negative	Site	Long term	Slight	Likely	Low	Low	• Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.	Low	Very Low	5	High
Project rental	Additional land use income	Positive	Site	Long term	Slight	Very Likely	High	Low	• None	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Occupation of the land by the infrastructure of multiple projects	Regional loss of agricultural land	Negative	Regional	Long term	Likely	Likely	Moderate	Moderate	None	Moderate	Not Applicable	3	Low

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 7:

Conclusions

CONTENTS

TABLES

FIGURES

7 CONCLUSIONS AND RECOMMENDATIONS

This chapter contains the main conclusions and recommendations from the EIA Process, provides the key findings of the specialist studies (i.e. outlines the most significant impacts identified, together with the key management actions required to avoid or mitigate the negative impacts or enhance positive benefits), an integrated summary of impacts that will influence decision-making by the Competent Authority (i.e. the DEA) and the associated management actions. In addition, the chapter also includes the EAP's opinion on whether the project should receive EA.

7.1 SUMMARY OF IMPACT SIGNIFICANCE: MAIN IMPACTS AND KEY RECOMMENDATIONS

The 2014 NEMA EIA Regulations (as amended on 7 April 2017) define a significant impact as "*an impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence*".

Based on the definition above, this section provides a summary of significant impacts identified and assessed by the specialists in **Appendices I to N** of this Draft EIA Report and summarised in Chapter 6 (as noted in Table 7- 1 below).

Table 7- 1: Specialist Studies and Statements

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Simon Bundy	Sustainable Development Projects (SDP)	Ecological & Hydrological Impact Assessment (including Terrestrial and Aquatic Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
EXTERNAL REVIEWERS		
Christo Bredenhann	WSP	Review of the Traffic Impact Statement compiled by the CSIR using existing studies in the project area.
Rudolph du Toit	Applied Science Associates (Pty) Ltd	Review of the Social Impact Statement compiled by the CSIR using existing studies in the project area.
Johann Lanz	N/A	Review of the Soils and Agricultural Impact Statement compiled by the CSIR using existing studies in the project area.
Andrea Gibb	SiVEST	External review of the VIA

The Visual Impact Assessment specialist study (included in Appendix M of this Draft EIA Report) was subject to a peer review process by an external reviewer (Andrea Gibb, SiVEST), as requested by the DEA. This external review report is included as an appendix to the Visual Impact Assessment. Please see Appendix M for the review letter and CV of the specialist attached. It must be noted that the recommendations for edits to be made to the VIA **have been made** post external review. Appendix M reflects those requested changes by SiVEST.

An Impact Statement for Agriculture, Traffic and Social was also compiled by the EAP and is included in Appendices N1 – N3 of this Draft EIA Report. These statements were externally reviewed (as described in Table 7.1 above) and a letter of confirmation of this is included in each statement. It must be noted that the statements serve as a general description of the existing and predicted impacts associated with the proposed project (using information from existing studies in the area) and does not classify as a specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017). Furthermore, the statements considered the full development (i.e. the development of the three Solar PV Facilities (i.e. Skeerhok PV 1, 2 and 3) and the associated electrical infrastructure (which subject to a separate BA Process).

In addition, a Radio Frequency Interference (RFI) Survey Technical Study was commissioned by the Project Applicant to determine the impact of the proposed project on the SKA. This report is not a standard specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations, as it is a detailed, technical report which provides a cumulative topographical analysis of the proposed PV projects in the Astronomy Geographic Advantage Area and was undertaken to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. The full RFI study can be found in **Appendix P**, and comment from SKA on the proposed Skeerhok PV 1, 2 and 3 projects can be found in **Appendices G and O.**

All the mitigation and management measures proposed by the specialists, including those additional impacts and management measures identified by the EAP have been included in the EMPr (Part B of this Draft EIA Report).

7.1.1 Ecological and Hydrological Impact Assessment

An Ecological Impact Assessment (including hydrology) (Appendix I of this Draft EIA Report) has been undertaken assess the potential impacts to ecological and hydrological features present on site. Table 7- 2 illustrates a summary of the total number of impacts identified in the Ecological Impact Assessment.

Table 7- 2: Summary of Ecological and Hyrdological Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	**Very Low**	**Low**	**Moderate**	**High**	**Very Low**	**Low**	**Moderate**	**High**
Construction Phase – Direct Impacts	**8**	4	3	1	0	6	2	0	0
Construction Phase – Indirect Impacts	**6**	4	1	1	0	5	1	0	0
Operational Phase – Direct Impacts	**6**	3	2	1	0	4	2	0	0
Operational Phase – Indirect Impacts	**2**	1	0	1	0	1	1	0	0
Decommissioning Phase – Direct Impacts	**4**	0	3	1	0	0	4	0	0
Cumulative Impacts	**11**	2	4	4	1	5	5	1	0
TOTAL IMPACTS	**37**								

The impacts in the Ecological Impact Assessment were rated with a negative status. No positive impacts have been identified in the assessment. Overall, as indicated in Table 7.2, the majority of the impacts identified in the Ecological and Hydrological Impact Assessment are predicted to be of a **low or very low significance** without the implementation of mitigation measures. Following the implementation of the proposed mitigation measures, the overall impact to ecology is considered to be **very low significance**. Overall, no impacts were assessed as being of high significance after the implementation of mitigation measures.

The following main mitigation measures were identified in the Ecological Impact Assessment specialist study and noted in the EMPr (Part B of the Draft EIA Report):

Pre-Construction:

- Pre-construction evaluation and possible plant rescue operations;
- Identification of intrusion of the proposed construction site and development footprint, into minor drainage lines (if any);
- Identification of laydown areas, roadways etc. on site and evaluation of affected points within site, particularly in respect of floral and faunal presence; and
- Permitting requirements in terms of the National Water Act and Northern Cape Conservation Act.

Construction Phase:

- Site induction and interaction within management on ecological aspects;
- Site inspection of any fauna within the construction area during post fencing completion;
- Monitoring of operations, including species presence within site, mortalities and sitings;
- Maintenance of vegetation and avoidance of unnecessary clearance of site;
- Exotic weed management; and
- Erosion control measures to be implemented where applicable.

Operational Phase:

- Monitoring of faunal activities within the fenced area of the site and immediate proximity of site;
- Management of faunal intrusion through the fencing, including possible mortalities;
- Consideration of lighting regime around the site and the impact of ELP.
- Vegetation management on site – consideration of redress methods of growth and habitat form around site;
- Exotic weed management; and
- Erosion control measures.

7.1.1.1 Overall conclusion

The Ecological and Hydrological Impact Assessment concludes that based on the consideration of the site and its present ecological state, as well as the nature of the proposed development, it is in the specialists opinion that the development cannot be precluded from the site on ecological or hydrological grounds, provided that suitable measures, as noted in the study (Appendix I) are implemented.

7.1.2 Visual Impact Assessment

As noted above, a Visual Impact Assessment specialist study was conducted (included in Appendix M) for the proposed construction of the Skeerhok PV 1. The assessment concluded that the landscape surrounding the proposed site has a rural agricultural character which has been transformed by extensive stock farming and large scale infrastructure in the form of the Sishen-Saldanha ore railway line and Eskom Nieuwehoop Substation.

Table 7- 3 illustrates a summary of the total number of impacts identified in the Visual Impact Assessment.

Table 7- 3: Summary of Visual Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	Very Low	Low	Moderate	High	Very Low	Low	Moderate	High
Construction Phase: Direct Impacts	5	0	3	2	0	3	2	0	0
Operational Phase: Direct Impacts	3	0	1	2	0	1	2	0	0
Decommissioning Phase: Direct Impacts	5	0	3	2	0	3	2	0	0
Cumulative Impacts	1	0	0	1	0	0	0	1	0
TOTAL IMPACTS	14								

The majority of the impacts identified in the Visual Impact Assessment were rated with a negative status. Overall, as indicated in Table 7- 3, the impacts identified in the Visual Impact Assessment are predicted to be of a **moderate** significance without the implementation of mitigation measures and **low** with mitigation.

The following main mitigation measures were identified in the Visual Impact Assessment specialist study:

<u>Construction Operation and Decommissioning Phases:</u>

- Minimise the footprint of cleared vegetation.
- Where possible, laydown areas and temporary construction equipment and camps should be placed in already disturbed areas in order to minimise vegetation clearing.
- Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure.
- Commence with restoration of disturbed, cleared land as soon as possible.
- Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).
- Plan trips so that it occurs during the day and where possible avoid construction vehicles movement on the regional road during peak time
- Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only.
- Develop a lighting plan that:
  - documents the design, layout and technology used for lighting;
  - indicates how nightscape impacts will be minimised;
  - includes a process for quick and effective resolution of lighting complaints; and
  - Do not exceed the minimum lighting requirement for effective safety and security.
  - Minimise bright light (uplighting and glare) with appropriate screening.
  - Reduce light pollution through the use of low-pressure sodium light sources.
  - Light fittings for security at night should reflect the light toward the ground and prevent light spill.
  - Avoid light spilling beyond the project boundary.
  - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting.
  - Switch off lights when not in use.
- Implement standard construction site dust control methods (i.e. dampening with water) as required.
- Implement fire risk reduction and containment measures, including:
  - worker awareness;
  - designated, safe smoking areas;
  - fire breaks; and

  - appropriate and working firefighting equipment.
- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures.
- Maintain painted features and repainted when colours fade or paint flakes.
- Choose materials, coatings and paints with minimum reflectivity where possible.
- Paint grouped structures the same colour to reduce colour contrast.
- Construct powerline towers to be similar to those already existing in the landscape, where possible.
- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures.
- Maintain painted features and repainted when colours fade or paint flakes.
- Paint grouped structures the same colour to reduce colour contrast.
- Adequate implementation of proposed mitigation measures and best practice to reduce visual impacts by all solar PV facilities in the vicinity.

7.1.2.1 Overall conclusion

The impact of visual intrusion to the views of potential sensitive visual receptors is expected to be moderate to low (before mitigation) and moderate to very low with the effective implementation of the mitigation and management actions outlined in this report. The impacts vary depending on the impact pathway being assessed.

Due to the existing landscape character, and foreseeable trend of renewable energy and associated electricity infrastructure development in the area, the cumulative impacts to the views of potential sensitive visual receptors are expected to be moderate, if all solar PV developments implement proposed mitigation measures and best practice to reduce visual impacts.

Based on the findings in the VIA it has been concluded that the juwi Skeerhok PV development, including its associated electricity infrastructure, from a visual, scenic, aesthetic and amenity perspective, may receive EA with adherence to the mitigation and management measures set out in this report.

7.1.3 Heritage Impact Assessment (Archaeology and Cultural Landscape) and Desktop Palaeontology Assessment

A Heritage Impact Assessment was undertaken as part of the EIA Process (included in Appendix K). A desktop Palaeontological Impact Assessment was also undertaken as part of the EIA Process (attached to the HIA in Appendix K) to provide an assessment of potential impacts on local palaeontology (i.e. fossil) within the proposed Skeerhok PV 1 facility area.

Table 7- 4 illustrates a summary of the total number of impacts identified in the HIA (including palaeontology).

Table 7- 4: Summary of Heritage and Palaeontology Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	Very Low	Low	Moderate	High	Very Low	Low	Moderate	High
Construction Phase: Direct Impacts	4	2	2	0	0	3	1	0	0
Operational Phase: Direct Impacts	1	0	1	0	0	0	1	0	0
Decommissioning Phase: Direct Impacts	1	0	1	0	0	0	1	0	0
Cumulative Impacts	4	2	2	0	0	3	1	0	0
TOTAL IMPACTS	10								

All the above impacts were rated with a negative status. Overall, the above impacts are predicted to be of a **low significance** with the implementation of mitigation measures. No impacts were assessed as being of moderate or high significance.

The following mitigation and monitoring requirements should be adhered to:

Mitigation requirements

- At this point there are no specific archaeological mitigation requirements because no significant sites were located within the project footprint.
- A pre-construction walk down survey be carried out during the design phase. The ECO will need to ensure that this survey is commissioned at least 6 months in advance of construction in order to allow for a mitigation process to be carried out in the unlikely event that this becomes necessary.
- Ensure that all works occur inside the approved development footprint.

Monitoring requirements

Only one significant site requiring in situ conservation was identified in close proximity to the proposed development footprint. This is site SHK2017/003. This site is of great archaeological significance and needs to be cordoned off and protected. The outline shown in Figure 25 in Appendix K represents the area that should be cordoned off (it includes a buffer of at least 30 m). The ECO should ensure that no transgression of the cordoned off area occurs through weekly inspections throughout the construction phase. Furthermore, whenever the ECO is on site they should be aware of any potential heritage material that may still be undiscovered. Graves are the main potential issue here.

7.1.3.1 Overall conclusion

The Palaeontological Impact Assessment concludes that there are no fatal flaws in the proposed development, nor are there objections to its authorisation as far as fossil heritage conservation is concerned, since significant impacts on scientifically valuable fossils or fossil sites are not anticipated.

The HIA concluded that because the potential impacts are few and entirely manageable, it is recommended that the proposed project be allowed to continue, should the mitigation and monitoring requirements be met.

7.1.4 Avifaunal Impact Assessment

An Avifaunal (bird) Assessment (Appendix J) was conducted as part of the EIA Process in order to identify and assess impacts associated with the construction and operation of the proposed project on the bird population and habitat in the project area.

It must be noted that the results of three seasons of bird monitoring have been included in this DEIAR which is in line with the **Regime 2** (Best practice guidelines, Jenkins *et al.,* 2017). Note this excerpt from the Avifaunal Specialist Study (Appendix J):

*"**NOTE:** For the purposes of this study we conducted **2 specialist site visits and 3 seasons** of on-site bird monitoring, in accordance with the best practice guidelines (Jenkins et al, 2017). The proposed project falls under **Regime 2** on account of being of 'medium' avifaunal sensitivity and greater than 150ha in extent. This means it requires 2 to 3 site visits of 3 to 5 days duration each over 6 months. We conducted 3 x 4 day site visits thereby slightly exceeding the minimum requirements in our view."*

Thus, there is **no incomplete information in this report** in terms of Avifaunal impacts or information being withheld from the public in this regard.

Table 7- 5 illustrates a summary of the total number of impacts identified in the Avifaunal Assessment.

Table 7- 5: Summary of Avifaunal Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	**Very Low**	**Low**	**Moderate**	**High**	**Very Low**	**Low**	**Moderate**	**High**
Construction Phase Impacts	2	0	1	0	1	0	1	1	0
Operational Phase Impacts	4	0	3	1	0	0	4	0	0
Decommissioning Phase Impacts	1	0	1	0	0	0	1	0	0
Cumulative Impacts	1	0	0	0	1	1	0	1	0
TOTAL IMPACTS	8								

As derived from Table 7.6 above, it is clear that all impacts were identified with a overall **low significance** with the implementation of mitigation measures. The impacts identified above are all rated with a negative status. The cumulative impact is considered to be **high** prior to the implementation of the required mitigation measures are but **moderate**, following mitigation.

The following main mitigation measures were identified in the Avifaunal Impact Assessment:

Construction, Operational and Decommissioning Phases:

- Water courses, drainage lines, streams and wetlands should be avoided and a no go buffer of 100m be applied around them.
- Dams and livestock water points should likewise be avoided with a 100m no go buffer.
- Rocky outcrops should be avoided with a 100m no go buffer.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted.
- Care should be taken not to introduce or propagate alien plant species/weeds during construction.
- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird

species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed.
- Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility.
- Very little is known about the impacts of solar facilities on birds in South Africa. For this reason post construction monitoring programme is recommended for this site in order to document any impacts and provide the basis for an adaptive management approach to any impacts.
- Mitigation is complex at electrical structures since there are many ways in which birds could get electrocuted as the hardware is complex and provides many different potential perches for birds. It is therefore recommended that mitigation be applied reactively once the facility is operational, only if a significant problem is detected. Monitoring of this infrastructure for bird fatalities should be built into the operational environmental management plan for the facility.
- We recommend that the operational phase EMPr include provision for application to the provincial authority for permits for any necessary nest management.

7.1.4.1 Overall conclusion

The Skeerhok PV 1 site is important habitat for an assemblage of arid zone bird species, many of which are endemic. The transformation of natural habitat for the proposed facility will therefore be of high significance. Fortunately, the facility will transform a small area relative to the remaining habitat, which is fairly uniform in the broader area. The impact of habitat destruction can be mitigated to <u>moderate significance</u> by ensuring that the more sensitive micro habitats are designated as no go areas. All other impacts are of <u>moderate to low significance.</u> It is recommended that the facility be authorised, provided that the recommendations of this report are implemented.

7.1.5 Soils and Agricultural Potential Impact Statement

A Soils and Agricultural Potential Impact Statement (Appendix N1) was conducted as part of the EIA Process using existing studies in the area in order to identify and assess all potential impacts of the proposed development on agricultural resources including soils and agricultural production potential, and to provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

Table 7- 6 illustrates a summary of the total number of impacts identified in the Soils and Agricultural Potential Statement.

Table 7- 6: Summary of Soils and Agricultural Potential Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	**Very Low**	**Low**	**Moderate**	**High**	**Very Low**	**Low**	**Moderate**	**High**
Construction Phase: Direct Impacts	**2**	2	0	0	0	2	0	0	0
Construction Phase: Indirect Impacts	**2**	1 (+)[1]	1	0	0	2	0	0	0
Operational Phase: Direct Impacts	**2**	2	0	0	0	2	0	0	0
Decommissioning Phase: Direct	**2**	2	0	0	0	2	0	0	0

[1] This indicates that this impact is rated as positive

Impacts									
Decommissioning Phase: Indirect Impacts	**2**	1(+)	1	0	0	2	0	0	0
Cumulative Impacts	**1**	0	0	1	0	0	0	1	0
TOTAL IMPACTS	**11**								

All of the above impacts were rated with a negative status, except for the impact relating to the generation of additional land use income through the rental of the land for the proposed solar energy facility, which was rated with a positive status.

Most impacts, apart from the cumulative impact, were assessed as having a **very low significance**.

The following main mitigation measures were identified in the Soils and Agricultural Potential Assessment:

<u>Construction, Operational and Decommissioning Phases:</u>

- Minimize the footprint of disturbance during construction and decommissioning activities.
- Confine vehicle access to roads only.
- Control dust generation during construction and decommissioning activities by implementing suitable, standard construction site dust control measures.
- Strip and stockpile topsoil from all areas where soil will be disturbed.
- After cessation of disturbance, re-spread topsoil over the surface.
- Dispose of any sub-surface spoil material, generated from excavations, where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.
- Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.
- Undertake a periodic site inspection to verify the occurrence of off-road vehicle tracks surrounding the site.
- Establish an effective record keeping system for each area where soil is disturbed for constructional and decommissioning purposes. Recommendations for the recording system are included in the EMPr (Part B of the EIA Report).
- Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring

7.1.5.1 Overall conclusion

The study concludes that because of the low agricultural potential of the site, the development should, from an agricultural impact perspective, be authorised.

7.1.6 Social Impact Statement

A Social Impact Statement (included in Appendix N3) was compiled by the EAP using existing studies and reviewed externally to investigate the potential social disruptors and associated social impacts likely to result from the proposed project.

Table 7- 7 below illustrates a summary of the total number of impacts identified in the Social Impact Statement.

Table 7- 7: Summary of Social Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	**Very Low**	**Low**	**Moderate**	**High**	**Very Low**	**Low**	**Moderate**	**High**
Construction Phase Impacts	**6**	0	2 (1+)[2]	4 (2+)	0	1	3	2	0
Operational Phase Impacts	**6**	0	2 (1+)	4 (2+)	0	1	3	2	0
Decommissioning Phase Impacts	**1**	0	0	1	0	0	1	0	0
Cumulative Impacts	**1**	0	0	1	0	0	0	1	0
TOTAL IMPACTS	**14 (6+)**								

No impacts were assessed as being of high significance with or without the implementation of mitigation. The overall significance rating of the negative and positive socio-economic impacts associated with the proposed project is **moderate.**

The following main mitigation measures were identified in the Social Impact Statement:

<u>Construction and Operational Phase:</u>

- Develop and implement a Workforce Recruitment Plan;
- Reserve employment, where practical, for local residents;
- Clearly define and agree upon the Project Affected People (PAP);
- Develop a database of PAP and their relevant skills and experience, or use an existing legitimate database of skills and expertise;
- Develop and implement a Stakeholder Engagement Plan;
- Delivery on the Economic Development Plan must be contractually binding on the proponent;
- Procure goods and services, where practical, within the study area;
- Obtain regularly required goods and services from as large a selection of local service providers as possible;
- The proponent should engage with local NGOs, CBOs and local government structures in the Kenhardt community to identify and agree upon relevant skills and competencies required;
- Such skills and competencies should then be included in the Economic Development Plan; and
- Where possible, align the Economic Development Plan with Local Municipality's IDP.

[2] This indicates that 1 of the 2 impacts were rates as positive

Decommissioning Phase:

- The proponent should comply with relevant South African labour legislation when retrenching employees;
- juwi should also consider appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning; and
- All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse.

7.1.6.1 Overall conclusion

The overall significance rating of the *negative* socio-economic impacts associated with the proposed project is *low to moderate*; whereas the overall significance rating of the *positive* socio-economic impacts associated with the proposed development is **moderate.**

It should be accepted that the development of the proposed projects is likely result in some form of negative social impact to the local community. However, such a negative impact needs to be weighed against the potential benefit likely to result from the same development. Given the overall medium significance negative impact of the project, as compared to the overall medium-high significance positive impact of the project; it can be concluded that the prospective socio-economic benefits of the proposed project outweighs the socio-economic losses/impacts.

7.1.7 Traffic Impact Statement

A Traffic Impact Statement was produced by the EAP to show the amount of traffic that can be expected during the construction and operational phase of the proposed development of the proposed project. This statement was externally reviewed (Appendix N2).

Table 7- 8 below illustrates a summary of the total number of impacts identified in the Traffic Impact Statement.

Table 7- 8: Summary of Traffic Impacts

		Significance Before Mitigation				Significance After Mitigation			
	Total Impacts	**Very Low**	**Low**	**Moderate**	**High**	**Very Low**	**Low**	**Moderate**	**High**
Construction Phase Impacts	**4**	0	2	1	1	0	3	1	0
Operational Phase Impacts	**4**	1	1	1	1	1	2	1	0
Decommissioning Phase Impacts	**4**	0	2	1	1	0	3	1	0
Cumulative Impacts	**3**	1	0	1	1	1	1	1	0
TOTAL IMPACTS	**15**								

Overall, the majority of the impacts identified as part of the TIS are predicted to be of a **low significance** without and with the implementation of mitigation measures. All impacts identified as being of **high significance are mitigated to moderate**, following the implementation of mitigation.

The following main mitigation measures were identified in the TIS:

Construction, Operational and Decommissioning Phases:

- Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the PGNC Department of Public Works, Roads and Transport.
- Provide a Transport Traffic Plan to SANRAL and the PGNC Department of Public works, Roads and Transport.
- Ensure that roadworthy and safety standards are implemented at all time for all construction.
- Adhere to all speed limits applicable to all roads used.
- Implement clear and visible signalisation indicating movement of vehicles and when turning off or onto the Transnet Service Road to ensure safe entry and exit.
- Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.
- Construction activities will have a higher impact than the normal road activity and therefore the road should be inspected on a weekly basis for structural damage.
- A Road Maintenance Plan should be developed for the section of the Transnet Service Road.
- Ensure that road network is maintained in a good state for the entire operational phase.

7.1.7.1 Overall conclusion

Based on the assessment of the potential impacts that can be associated with the traffic to be generated during the construction, operation and decommissioning phases of the reference projects, the overall impact from traffic generation is anticipated to be **low** when implementing suitable mitigation measures. The highest traffic will be generated during the construction phase.

7.1.8 Radio Frequency Interference Study

Interference Testing and Consultancy Services (Pty) Ltd was appointed by the juwi Renewable Energies to undertake a test on radio frequency emissions to determine technology risks (power conversion, trackers control systems, etc.) of a renewable energy system (Appendix P). This study included potential impact and mitigation requirements.

It was concluded that based on the current SKA location information, the impact analysis shows that without adequate mitigation a possible interference scenario between the Skeerhok PV1 and the SKA installations may occur. This impact can be **adequately mitigated** through the implementation of standard mitigation techniques with standard off the shelf components. The mitigation required should include an allowance of 8dB for cumulative impact of adjacent sites should they be constructed, totalling less than 20dB. In a letter of formal correspondence the SKA South Africa supports the view that the required attenuation is achievable following appropriate design decisions and implementation of mitigation measures. However the project is required to prepare and submit an EMC (Electromagnetic Compatability) Control Plan to SKA South Africa for approval prior to any detailed design and construction activities associated with the proposed facilities.

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7.2 SUMMARY: COMPARATIVE ASSESSMENT OF POSITIVE AND NEGATIVE IMPACTS

Section 7.1 provides a summary of the findings of the specialist studies (or statements) that were undertaken as part of this EIA Process. Table 7- 9 summarises the overall significance of these impacts following the implementation of the recommended mitigation and management measures. **From this table it can be seen that no negative impacts of high significance are anticipated to occur as a result of this project provided the stipulated management actions are implemented effectively.** The positive impacts generated by the project (as seen in the table below) are associated with the economic benefits from employment opportunities, and the additional source of income from the rental of the land for the construction and operation of the PV facility.

Table 7- 9: Comparative Assessment of Positive and Negative Direct and Indirect Impacts

Specialist Study	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
Ecological and Hydrological Impact Assessment	Negative: Very Low	Negative: Very Low
Palaeontology/Archaeology/Heritage Impact Assessment	Negative: Low	Negative: Very Low
Visual Impact Assessment	Negative: Moderate	Negative: Low
Avifauna Impact Assessment	Negative: Moderate	Negative: Low
Soils and Agricultural Potential Impact Statement	Negative: Very Low	Negative: Very Low
	Positive: Very Low	Positive: Very Low
Traffic Impact Statement	Negative: Low	Negative: Low
Social Impact Statement	Negative: Moderate	Negative: Low
	Positive: Moderate	Positive: Moderate

7.3 CONSIDERATION OF ALTERNATIVES

The alternatives that were considered as part of the EIA Phase for the Skeerhok PV 1 facility are included in Chapter 5 of this EIA Report.

7.3.1 No-go Alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Skeerhok PV 1 project. This alternative would result in no environmental impacts on the site or surrounding local area. The following implications will occur if the "no-go" alternative is implemented:

- No benefits will be derived from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by this project at this location. The proposed 100 MW facility is predicted to generate approximately 200 GW/h per year which could power 20 000 households;
- The "no go" alternative will not contribute to and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030;

- Additional power to the local grid will need to be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO_2 emissions and water consumption;
- Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
- Local communities will continue their dependence on agriculture production and government subsidies. The local municipality's vulnerability to economic downturns will increase because of limited access to capital;
- There will be no opportunity for additional employment in an area where job creation is identified as a key priority. Approximately 1600 (600 direct and 1000 indirect) employment opportunities will be created during the construction period and 200 (50 direct and 150 indirect) employment opportunities will be created during the operation period of the proposed project;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending, the proposed implementation of an Economic Development Plan and the creation of local employment opportunities will not be realised; and
- The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- There will be no development of solar energy facilities at the proposed location;
- Only the agricultural land use will remain;
- No vegetation will be removed or disturbed during the development of these facilities; No avifauna will be negatively impacted on;
- No change to the current landscape will occur;
- No heritage artefacts will be impacted on; and
- No additional water use during the construction phase and the cleaning of panels during the operational phase.

As discussed in Chapter 1 of this Draft EIA Report, the purpose of the proposed Skeerhok PV 1 project is to feed electricity generated by a renewable energy resource into the national electricity grid. Many other socio-economic and environmental benefits will result from the development of this project such as development of renewable energy resources in the country and contribution to the increase of energy security, employment creation and local economic development (as noted above).

In addition, the Soils and Agricultural Potential Statement (Appendix N1) notes that the land on which the proposed project will be constructed is of low agricultural potential and is not suitable for cultivation. Therefore, the current land-use (i.e. agricultural use) is not deemed as the preferred alternative and can still continue around the site for the lifetime of the project.

Hence, while the "no-go" alternative will not result in any negative environmental impacts; it will also not result in any positive community development or socio-economic benefits, nor will it generate an alternative land-use income from the solar energy facility. It will also not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. Hence the "no-go" alternative is not a preferred alternative.

7.3.2 Land-Use Alternative

As discussed above, the sole use of the land for agriculture is not a preferred alternative.

Where the “activity” is the generation of electricity, possible reasonable and feasible land-use alternatives for the proposed properties include Biomass, Hydro Energy and Wind Energy. However, based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed to be appropriate or suitable for the site. Furthermore, from an impact and risk assessment perspective, the implementation of a solar PV project on the proposed project site will result in fewer risks and low significance impacts in comparison to the implementation of wind energy, hydro power and biomass.

As previously noted, the proposed solar facility currently falls within the REDZ 7. The proposed project is therefore in line with the criteria of the SEA and located in an area of strategic importance for Solar PV development. It should be noted that even if a project falls within a REDZ, the proposed development still requires site specific assessments as per the site protocol (still in development and not yet promulgated) in order to determine the potential impacts of a project at a local and site specific level.

Therefore, the implementation of a solar energy facility at the proposed project site is more favourable and feasible than other alternative energy facilities (i.e. for generating 20 MW or more from a renewable resource). Therefore in terms of project and location compatibility, the proposed solar facility is considered to be the most feasible renewable energy land use alternative. The experience that the Project Applicant has within the solar energy development industry will positively benefit the proposed project.

7.3.3 Site and Location Alternatives

As discussed in Chapter 5 of this EIA Report, only the preferred site for the Skeerhok PV 1 facility has been assessed in this EIA. From an impact and risk assessment perspective, the implementation of a solar PV project on the Smutshoek Farm 395 will result in fewer risks in comparison to its implementation at an alternate site within the Northern Cape (i.e. regions with similar irradiation levels). The following risks and impacts will be likely in this case:

- There is no guarantee that suitable land will be available for development of a solar PV facility. Site geotechnical conditions, topography, fire potential and ready access to a site might not be suitable, thus resulting in negative environmental implications and reduced financial viability.
- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example the agricultural potential for alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites within the Northern Cape will be located close to existing or proposed electrical infrastructure to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

As previously noted, the proposed Skeerhok PV 1 facility is one phase of a bigger project by juwi to develop three Solar PV Facilities in total. The main determining points for juwi was to find suitable, developable land in one contiguous block to optimise design, minimise costs, and minimise sprawling development and impact footprints. In addition, the proximity to the Eskom Nieuwehoop Substation was a major determinant for identifying suitable sites for the proposed development.

Given the site selection requirements associated with solar energy facilities and the suitability of the land available on Smutshoek Farm 395, no other location or site alternatives have been considered in the EIA Phase.

7.3.4 Layout Alternatives

As part of the EIA, a larger 400 ha area was assessed by the specialists and considered during this EIA. The Development Envelope has been determined for the project based on the environmental sensitivities present on the site, which is discussed further in Appendices I to N of this EIA Report. Based on the findings of the specialist studies, an environmental sensitivity map has been produced which shows the sensitivities on site within the larger 400 ha buildable area that was assessed. Based on this map, the preferred location for the 300 ha Skeerhok PV 1 facility (i.e. Development Envelope), avoids the sensitive features that were identified by the specialists within the original 400 ha buildable area. The preferred layout is shown in Figure 7- 1.

It is important to note that should the layout change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the Development Envelope would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the EIA Phase.

7.3.5 Technology Alternatives

As discussed in Chapter 2 and Chapter 5 of the Draft EIA Report, only the PV solar panel technology type has been considered in the EIA Phase.

The main mounting systems that will be considered as part of the design are:

- Single axis tracking systems;
- Dual axis tracking systems; and
- Fixed Tilt Mounting Structure.

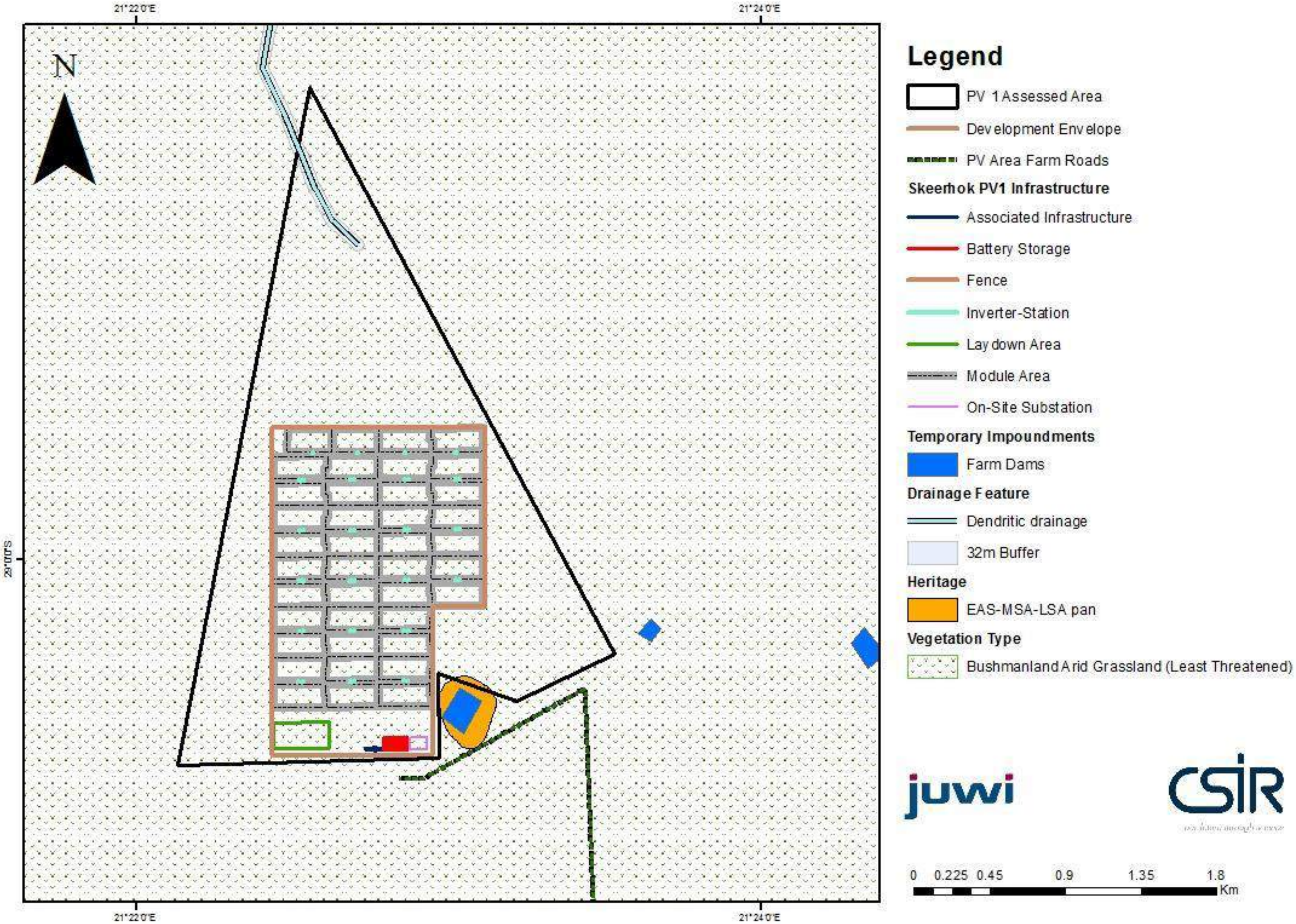

Figure 7- 1: Site layout overlain onto an Environmental Sensitivity Map for the Proposed Skeerhok PV 1 Facility

7.4 PERMITS AND LICENSES REQUIRED

7.4.1 NEMA and 2014 NEMA EIA Regulations

Before clearing of the proposed site is initiated, an EA must be granted by the DEA in terms of the NEMA and associated 2014 NEMA EIA Regulations (as amended on 7 April 2017). This report has been has been compiled to provide the DEA with the information required in order to make an informed decision on whether to grant or reject EA.

7.4.2 Permit in terms of the National Water Act (Act 36 of 1998)

The National Water Act (Act 36 of 1998) controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. As noted in Chapter 4 of this EIA Report, Section 21 of the Act lists the following water uses that need to be licensed:

a) taking water from a water resource;
b) storing water;
c) impeding or diverting the flow of water in a watercourse;
d) engaging in a stream flow reduction activity contemplated in section 36;
e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) disposing of waste in a manner which may detrimentally impact on a water resource;
h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) altering the bed, banks, course or characteristics of a watercourse;
j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) using water for recreational purposes.

The Ecological Impact Assessment states that authorisation for changes in land use up to 500 m from a defined water resource/wetland system will require an application for a Water Use Licence from the DWS. A Water Use Licence will be required in respect of the proposed development under Section 21 (c) and (i) of the Act, however such licence should not preclude this development. The DWS will be consulted with during the EIA Process to confirm the need for a WUL, as well as to seek comment on the proposed project.

7.4.3 Permit in terms of the National Forest Act (Act 84 of 1998)

The Ecological Impact Assessment notes that the National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified “protected trees”. Listed species that may be encountered with the site include Boscia spp and possibly *Acacia erioloba*. The assessment also notes that it is unlikely that an application for the “clearing of a natural forest”, as defined within the Act, will be required on the site.

The absence or presence of these species will be confirmed as part of the plant rescue and protection plan and should any species be present and determined that they will be impacted on, permits will be obtained from DAFF.

7.4.4 Permit in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009)

The Ecological Impact Assessment notes that the Northern Cape Conservation Act (Act 9 of 2009) under its pertinent regulation governs the disturbance of species, or possibly other species not yet identified on site. A permit from the Provincial Department of Environment and Nature Conservation (DENC) will be required in order to disturb or translocate such species. The absence or presence of these species will be confirmed as part of the plant rescue and protection plan and should any species be present and determined that they will be impacted on, permits will be obtained from DENC. The relocation of the *Aloe dichotoma* as it falls within the development footprint of the proposed PV facility will require a permit in terms of the Northern Cape Conservation Act (Act 9 of 2009).

7.4.5 Permit in terms of the National Heritage Resources Act (Act 25 of 1999) (NHRA)

As noted in the Heritage Impact Assessment (Appendix K), the NHRA does not require the developer to obtain permits prior to construction. However, any archaeological mitigation work (i.e. test excavations, sampling etc.) that may be required (in the event of archaeological resources or graves of significance being found within the development footprint during construction) would need to be conducted under a permit issued to, and in the name of, the appointed archaeologist. The permit application process allows the heritage authorities to ensure that a suitably qualified and experienced archaeologist undertakes the work and that the proposed excavation/sampling methodology is acceptable.

In terms of palaeontology, where palaeontological mitigation is required in the event of any fossil material found on site during construction, the palaeontologist concerned with mitigation work would need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies recently developed by SAHRA (2013).

7.4.6 Astronomy Geographic Advantage (Act 21 of 2007)

As mentioned previously RFI studies have been undertaken and commissioned by the Project Applicant to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. The SKA Project Office has provided comment which can be seen in Appendix O. The mitigation of all risk associated with RFI on the SKA must be confirmed by measurement following construction to the satisfaction of the SKA Office. Should the risk of radio interference still exist, based on measurements, further mitigation methods must be implemented to remove outstanding risk of radio frequency interference.

7.5 OVERALL EVALUATION OF IMPACTS BY THE EAP

Based on the findings of the specialist studies the proposed project is considered to have an **overall very low to low negative environmental impact and an overall moderate positive impact** (with the implementation of respective mitigation and enhancement measures).

The proposed project will take place within the Development Envelope, as discussed in Section 7.3.4. of this chapter. The layout of the PV facility within the assessed Development Envelope, as shown in Figure 7- 1, will avoid the sensitive ecological and heritage features identified by the respective specialists (where possible).

In accordance with the Guideline on Need and Desirability (GN 891 of 2014), this EIA considered the nature, scale and location of the development as well as the wise use of land (i.e. is this the right time and place for the development of this proposed project). When considering the timing of this project, the IRP2010 proposes to secure 17 800 MW of renewable energy capacity by 2030. As noted in the preceding chapters of this EIA Report, in August 2011, the DOE launched the REIPPPP and invited potential IPPs to submit proposals for the financing, construction, operation and maintenance of the first 3 725 MW of various renewable energy project (including solar and wind).

On a provincial level, the Northern Cape Province is currently facing considerable constraints in the availability and stability of electricity supply. This is a consequence of South Africa's electricity generation and supply system being overstretched, and the reliance of the Northern Cape, as many other South African provinces, on the import of power to service its energy needs. The development of solar energy is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. On a municipal planning level, the proposed project does not go against any of the objectives set within the !Kheis Municipality draft IDP 2017/18. The proposed project will be in line with and will be supportive of the IDP's objective of creating more job opportunities. The proposed solar energy facility will assist in local job creation during the construction and operation phases of the project (if approved by the DEA). It should however be noted that employment during construction phase will be temporary. During the operational phase of the project (estimated to be more 20 years), long-term employment opportunities will be created.

The locality of the proposed project will fall within an area that has already been transformed due to the presence of the Sishen-Saldanha ore line, the Eskom Nieuwehoop Substation and Eskom transmission lines that will be constructed within this area. The locality of this project would not have a significant ("high") impact on any sensitive viewers (as determined in the Visual Impact Assessment included in Appendix M of this EIA Report), will not significantly negatively impact on any environmental features (as discussed above), and will have a very low significance negative impact on the current agricultural land use of the site.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site (as shown in Figure 7- 1) and through appropriate monitoring and management plans included in the EMPr (Part B of the EIA Report).

The outcomes of this project therefore succeeds in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e. this project is a renewable energy project and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the project will promote justifiable economic and social development.

In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Part B of this Draft EIA Report. The mitigation measures necessary to ensure that the project is planned, constructed, operated and decommissioned in an environmentally responsible manner are listed in this EMPr. The EMPr is a dynamic document that should be updated regularly and provide clear and implementable measures for the establishment and operation of the proposed Solar PV facility.

Taking into consideration the findings of the EIA Process and given the national and provincial strategic requirements for infrastructure development, it is the opinion of the EAP that the project benefits outweigh the costs and that the project will make a positive contribution to steering South Africa on a pathway towards sustainable infrastructure development. Provided that the specified mitigation measures are applied effectively, it is recommended that the project receive EA in terms of the 2014 EIA Regulations (as amended on 7 April 2017) promulgated under the NEMA.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

CHAPTER 8:

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DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

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DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX A:

Curriculum Vitae of the Environmental Assessment Practitioner

CONTENTS

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Email: plochner@csir.co.za

Curriculum Vitae of Paul Lochner – Technical Advisor and Quality Assurance (EAPSA) Certified

Name of firm	CSIR
Name of staff	Paul Lochner
Profession	Environmental Assessment and Management
Position in firm	Manager: CSIR Environmental Management Services
Years' experience	24 years
Nationality	South African

Biographical Sketch

Paul Lochner commenced work at CSIR in 1992, after completing a degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at CSIR focused on sediment dynamics and soft engineering applications in the coastal zone, in particular, beach and dune management. He conducted several shoreline erosion analyses and prepared coastal zone management plans for beaches. He also prepared wetland management plans.

As the market for environmental assessment work grew, he led Environmental Impact Assessments (EIAs), in particular for coastal resort developments and large-scale industrial developments located on the coast; and Environmental Management Plans (EMPs), in particular for wetlands, estuaries and coastal developments. He has also been involved in researching and applying higher-level approaches to environmental assessment and management, such as Strategic Environmental Assessment (SEA). In 1998-1999, he coordinated the SEA research programme within the CSIR, which led to him being a lead author of the Guideline Document for SEA in South Africa, published by CSIR and national Department of Environmental Affairs (DEA) in February 2000.

In 1999 and 2000, he was the project manager for the legal, institutional, policy, financial and socio-economic component of the Cape Action Plan for the Environment ("CAPE"), a large-scale multi-disciplinary study to ensure the sustainable conservation of the Cape Floral Kingdom. This was funded by the Global Environmental Fund (GEF) and prepared for WWF-South Africa. The study required extensive stakeholder interaction, in particular with government institutions, leading to the development of a Strategy and Action Plan for regional conservation.

In July 2003, he was certified as an Environmental Assessment Practitioner by the

Interim Certification Board for Environmental Assessment Practitioners of South Africa.

He has authored several guidelines for government. In 2004, he was lead author of the *Overview of IEM* document in the updated Integrated Environmental Management (IEM) Information Series published by national Department of Environmental Affairs and Tourism (DEAT). In 2005, he was part of the CSIR team that prepared the series entitled *Guidelines for involving specialists in EIA processes* for the Western Cape Department of Environmental Affairs and Development Planning (DEADP); and he authored the *Guideline for Environmental Management Plans* published by Western Cape government in 2005. In 2006-2007, he worked closely with the (then) Dept of Minerals and Energy (DME) of South Africa to prepare a Guideline for Scoping, Environmental Impact Assessment and Environmental Management Plans for mining in South Africa.

Over the past 20 years has been closely involved with several environmental studies for industrial and port-related projects in Coega Industrial Development Zone (IDZ), near Port Elizabeth. This included the SEA for the establishment of the Coega IDZ in 1996/7, an EIA and EMP for a proposed aluminium smelter in 2002/3, and assistance with environmental permit applications for air, water and waste. At the Coega IDZ and port, he has also conducted environmental assessments for port development, LNG storage and a combined cycle gas turbine power plant, manganese export, rail development, marine pipelines, and wind energy projects.

Since 2009, he has undertaken numerous EIAs for the renewable energy sector, in particular for wind and solar photovoltaic energy projects. In these EIAs, he has been project leader and integrated the specialist findings from a range of specialist disciplines.

He is currently project leader on two Strategic Environmental Assessments (SEAs) that are being undertaken for national DEA. These SEAs are to support the implementation of the Strategic Integrated Projects (SIPs) that are being promoted by the Presidential Infrastructure Coordinating Committee (PICC). The SEA for Wind and Solar Photovoltaic Energy for South Africa is being conducted over 2013-2014, and the SEA for electricity grid infrastructure commenced January 2014.

Since 2009, Paul has been the manager of the Environmental Management Services (EMS) group within CSIR. This group currently consists of approximately 20 environmental assessment practitioners and a group assistant, with offices in Stellenbosch and Durban. EMS focuses on conducting complex environmental studies in challenging environments, such as remote and data poor regions in Africa (e.g. Cameroon, Gabon, Angola, Namibia and Ethiopia). We also specialise in environmental studies for emerging and innovative technologies, drawing on research and applied scientific expertise within CSIR. Our role is to assist in ensuring the sustainability of projects in terms of environmental and social criteria, by providing a range of environmental services that extend across the project lifecycle, from the pre-feasibility stage through to feasibility, commissioning, operations and closure. We provide this service to government, international agencies, private sector and non-government organisations.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Paul Lochner has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**SEA for Aquaculture** Development in South Africa (marine and freshwater)	Project leader	DEA and DAFF
In progress	**SEA for the Square Kilometre Array** radio-telescope in the Karoo, South Africa	Project leader	DEA and DST
2015-2017	**SEA for Shale Gas Development** in South Africa	Project co-leader	Dept of Environmental Affairs (DEA), DMR, DOE, DST, DWS
2015-2016	SEA for the development of **Electrical Grid Infrastructure** for South Africa	Project leader	DEA
2016-2017	EIA for the 75 MW x 12 **solar photovoltaic** energy projects near Dealesville, Free State	Project Leader	Mainstream Renewable Power SA
2014-2015	SEA of **planning** for the far south Cape Peninsula	Project Leader	City of Cape Town
2013-2015	EIA for the Ishwati Emoyeni 140 MW **wind energy project** and supporting electrical infrastructure near Murraysburg, Western Cape	Project Leader	Windlab
2013-2015	EIA for the Saldanha marine outfall **pipeline**	Project Leader	Frontier Saldanha Utilities
2012-2015	SEA for identification of **renewable energy zones** for wind and solar PV projects in South Africa	Project leader	DEA
2012-2013	**Environmental Screening Study for a desalination plant** for the City of Cape Town	Project leader	City of Cape Town & WorleyParsons
2012-2013	EIA for **LNG Import** to the Mossel Bay Gas-to-Liquid refinery (stopped end of Scoping)	Project leader	PetroSA
2012-2013	EIA for the **desalination plant** for the Saldanha area	Project leader	West Coast District Municipality &

Completion Date	Project description	Role	Client
			WorleyParsons
2012-2013	EIA for the **manganese export terminal** at the Port of Ngqura and Coega IDZ	Project leader	Transnet
2011 - 2012	EIA for the **100 MW solar photovoltaic** project proposed by Mainstream Renewable Power at Blocuso, near Keimoes in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA for the **100 MW solar photovoltaic** project proposed by Mainstream Renewable Power at Roode Kop Farm, near Douglas, in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA for the 75 MW **solar photovoltaic project** proposed by Solaire Direct at **GlenThorne**, near Bloemfontein in the Free State	Project leader	Solaire Direct
2011 – 2012	EIA for the 75 MW **solar photovoltaic project** proposed by SolaireDirect at **Valleydora**, near Springfontein in the Free State	Project leader	Solaire Direct
2010-2011	More than 10 Basic Assessments (BAs) for **solar photovoltaic projects** in the western cape, Northern Cape, Eastern Cape and Free State	Project leader	Various clients including Dutch, German, French and South African companies
2010/2011	**EIA for the Langerfontein** wind project near Darling, Western Cape.	Project leader	Mr Herman Oelsner, Khwe Khoa
2010/2011	**EIA for a 100 MW wind project at Zuurbron and a 50 MW wind project Broadlands** in the Eastern Cape	Project leader	WindCurrent SA (German-based company)
2010/2011	**EIA for the proposed 143 MW Biotherm wind energy project near Swellendam**, Western Cape, South Africa	Project leader	Biotherm South Africa (Pty) Ltd
2010/2011	**EIA for the proposed InnoWind wind energy projects near Swellendam, Heidelberg, Albertinia and Mossel Bay (totalling approx 210 MW),** Western Cape, South Africa	Project leader	InnoWind South Africa (Pty) Ltd

Completion Date	Project description	Role	Client
2009/2010	**EIA for the proposed Electrawinds wind energy facility** of 45-75 MW capacity in the Coega IDZ, Eastern Cape	Project leader	Electrawinds N.V. (Belgium)
2009/2010	**EIA for proposed 180 MW Jeffreys Bay wind energy project,** Eastern Cape	Project Leader and co-author	Mainstream Renewable Power South Africa
2009/2010	**Basic Assessment for the national wind Atlas for South Africa**	Project leader	SANERI and SA Wind Energy Programme, Dept of Energy
2009/2010	**EIA for the proposed Gecko soda plant,** Otjivalunda and Arandis, Namibia (cancelled)	Project leader	Gecko, Namibia
2009-2010	**EIA for the proposed desalination plant** at Swakopmund, Namibia	Project leader	NamWater, Namibia
2009	**EMP for the Operational Phase of the Berg River Dam**, Franschoek, South Africa	Project leader and report co-author	TCTA, South Africa
2009/2010 *(on hold)*	**EIA for the proposed crude oil refinery** at Coega, South Africa	Project leader and lead author	PetroSA, South Africa
2008	**Environmental Risk Review** for proposed LNG/CNG import to Mossel Bay, South Africa	Project leader and lead author	PetroSA, South Africa
2008	**Review of the Business Plan** for catchment management for the Berg Water Dam Project, Franschhoek, South Africa	Project reviewer and co-author	TCTA, South Africa
2007 – 2010	**EIA for proposed Jacobsbaai Tortoise Reserve eco-development**, Saldanha, Western Cape	Project Leader and co-author	Jacobsbaai Tortoise Reserve (Pty) Ltd
2007 – 2010	**Independent reviewer** for the EIA proposed Amanzi lifestyle development, Port Elizabeth	Independent reviewer appointed to advise EAP	Public Process Consultants and Pam Golding
2007 – 2008	**EIA for proposed 18 MW Kouga wind energy project,** Eastern Cape	Project Leader and co-author	Genesis Eco-Energy (Approved by DEDEA in March 2009)
2007	**Review of EIA for the proposed Hanglip Eco-Development**, Plettenberg Bay, Western Cape	Co-author of review of EIA, undertaken on behalf of DEADP	Dept of Environmental Affairs & Development Planning, Western Cape
2006-2007	**Scoping phase for the EIA for the**	Project Leader and co-author	Eskom and iGas

Completion Date	Project description	Role	Client
	proposed Coega LNG-to-Power Project at the Port of Ngqura, Coega IDZ		
2006-2007	**Guideline** for Scoping, Environmental Impact Assessment and Environmental Management Plans for mining in South Africa	Project leader and co-author	Dept of Minerals and Energy (DME), South Africa
2006	**Environmental Impact Assessment (EIA)** for the extension of the Port of Ngqura, Eastern Cape	Project Leader and co-author	Transnet
2006	**Integrating Sustainability Into Strategy: Handbook** (Version 1)	Project Leader and co-author	CSIR (STEP research report)
2005	**Technology Review** for the proposed aluminium smelter at Coega, South Africa	Project Leader and lead author	Alcan, Canada
2005	**Environmental and Social Impact Assessment (ESIA) report** for the proposed alumina refinery near Sosnogorsk, Komi Republic, Russia	Project manager and co-author	Komi Aluminium, Russia, IFC, EBRD
2005	**Guideline for Environmental Management Plans (EMPs)** for the Western Cape province, including conducting a training course for provincial government	Author	Dept of Environmental Affairs & Development Planning, Western Cape
2005	**Guideline for the review of specialist studies** undertaken as part of environmental assessments	Member of Steering Committee and project facilitator	Dept of Environmental Affairs & Development Planning, Western Cape
2004	**Review of Strategic Management Plan** for Table Mountain National Park (2001-2004)	Reviewer and co-author	South African National Parks
2004	**Strategic Needs Assessment Process** for mainstreaming sustainable development into business operations	Researcher and co-author	CSIR (internal research)
2004	**Environmental Monitoring Committees** booklet in the IEM Information Series for DEAT	Contributing author	Department of Environmental Affairs and Tourism (DEAT)
2004	**Overview of Integrated Environmental Management** (IEM) booklet in the IEM	Lead author and researcher	DEAT

Completion Date	Project description	Role	Client
	Information Series		
2003	**Environmental Screening Study** for gas power station, South Africa	Project Manager and lead author	Eskom, iGas and Shell
2003	**Environmental Management Programme** (EMP) Framework for the proposed Coega Aluminium Smelter; and assistance with preparing permit and licence applications	Project Manager and lead author	Pechiney, France
2003	**Environmental Management Plan** for the Operational Phase of the wetlands and canals at Century City, Cape Town	Project leader and lead author	Century City Property Owners' Association
2002	**Environmental Impact Assessment** for the proposed Pechiney aluminium smelter at Coega, South Africa	Project Manager and lead author	Pechiney, France
2002 - 2003	**Research project:** Ecological impact of large-scale groundwater abstraction on the Table Mountain Group aquifer	Project Manager	Water Research Commission
2002	**Environmental Management Plan** for the Eskom Wind Energy Demonstration Facility in the Western Cape	Co-author	Eskom
2001-2002	**Environmental Impact Assessment** for the Eskom Wind Energy Demonstration Facility in the Western Cape	Quality control & co-author	Eskom
2001	**Environmental Due Diligence** study of four strategic oil storage facilities in South Africa	Project manager and co-author	SFF Association
2000	**Cape Action Plan for the Environment**: a biodiversity Strategy and Action Plan for the Cape Floral Kingdom - legal, institutional, policy, financial and socio-economic component	Project manager and contributing writer	World Wide Fund for Nature (WWF): South Africa
1999	**Environmental Management Plan** for the establishment phase of the wetlands and canals at Century City, Cape Town	Project manager and lead author	Monex Development Company
1999	**Environmental Management Programme** for the Thesen	Process design and Co-author	Chris Mulder Associates Inc; Thesen

Completion Date	Project description	Role	Client
	Islands development, Knysna		and Co.
1999	**Management Plan** for the coastal zone between the Eerste and Lourens River, False Bay, South Africa	Project manager and lead author	Heartland Properties and Somchem (a Division of Denel)
1998	**Environmental Assessment** of the Mozal Matola Terminal Development proposed for the Port of Matola, Maputo, Mozambique	Project manager and author.	*SNC-Lavalin-EMS*
1998	**Strategic Environmental Assessment (SEA)** for the Somchem industrial complex at Krantzkop, South Africa	Project manager and co-author	Somchem, a Division of Denel
1997	**Strategic Environmental Assessment (SEA)** for the proposed Industrial Development Zone and Harbour at Coega, Port Elizabeth, South Africa	SEA project manager and report writer	Coega IDZ Initiative Section 21 Company
1996	**Environmental Impact Assessment** of Development Scenarios for Thesen Island, Knysna, South Africa	Project manager and report writer	Thesen and Co.
1996	**Environmental Impact Assessment** of the Management Options for the Blouvlei wetlands, Cape Town	Project manager and report writer	Ilco Homes Ltd (now Monex Ltd)
1995	**Environmental Impact Assessment** for the Saldanha Steel Project, South Africa	Report writing and management of specialist studies	Saldanha Steel Project
1994	**Environmental Impact Assessment** for the upgrading of resort facilities on Frégate Island, Seychelles	Member of the project management team, co-author, process facilitator	Schneid Israelite and Partners
1994	**Environmental Impact Assessment** for exploration drilling in offshore Area 2815, Namibia	Project manager and co-author	Chevron Overseas (Namibia) Limited
1994	**Management Plan** for the Rietvlei Wetland Reserve, Cape Town	Project manager and lead author	Southern African Nature Foundation (now WWF-SA)
1993	**Beach management plan** for Stilbaai beachfront and dunes, South Africa	Project manager and lead author	Stilbaai Municipality

Completion Date	Project description	Role	Client
1993	**Beach and dune management plan for Sedgefield** for the beach east of the mouth of the Swartvlei estuary	Project manager and lead author	Nel and De Kock Planners, George
1993	**Coastal Stability analysis and beach management plan** for the Table View coastline north of Blaauwberg Road, Cape Town	Project manager and lead author	Milnerton Municipality

EMPLOYMENT RECORD

- **1992 to present** Involved in coastal engineering studies; and various forms of environmental assessment and management studies. Council for Scientific and Industrial Research – Environmental Management Services (EMS) - Stellenbosch

QUALIFICATIONS/EDUCATION

- M. Phil. Environmental Science (University of Cape Town)
- B.Sc. Civil Engineering (awarded with Honours) (University of Cape Town)

LANGUAGE CAPABILITY

LANGUAGES	*Speaking*	*Reading*	*Writing*
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

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Curriculum Vitae of Surina Laurie – Project Leader (*Pr. Sci. Nat.*)

Name of firm	CSIR
Name of staff	Surina Laurie
Profession	Environmental Assessment Practitioner
Position in firm	Project Manager/Senior Environmental Assessment Practitioner
Years' experience	6 years
Nationality	South African

Biographical Sketch

Surina has more than 6 years' experience as an Environmental Assessment Practitioner (EAP). She completed both her BSc in Conservation Ecology and MPhil in Environmental Management (part-time) at the University of Stellenbosch. With her honours project, she worked closely with the Endangered Wildlife Trust Riverine Rabbit Working Group and was responsible for determining the conservation opportunity for the Riverine Rabbit in the Karoo. With this project, she gained valuable experience in how to interact and manage stakeholders in such a way that a project's objectives and conservation goals are met without the stakeholders not being included in the decision-making process. The management of stakeholders and the ability to incorporate and/or adequately reflect their input are considered to be an essential component of an Environmental Impact Assessment (EIA) process.

With her Masters' thesis she researched and addressed why there is a need to undertake a Cost Benefit Analysis (CBA) as part of any EIA. The need for a CBA stems from the fact that losing environmental services will have an economic impact on a regional/national level in the long term but this is usually not considered during an EIA process. A CBA will look at both the economic benefits (profit) from a project and the economic losses because of loss of ecosystem services or rehabilitation costs. By including a CBA in an EIA, both the economic and environmental financial implications (not just the environmental significance of an impact) of a project will be considered by the decision making authority prior to the issuing of Environmental Authorisations or permits. To further expand her knowledge in this field, she has recently obtained a Postgraduate Certificate in Environmental Economics from the University of London.

She has experience as a project manager and project leader for Basic Assessments and Scoping and Environmental Impact Assessments for various sectors, including renewable energy, industry and tourism.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Surina Laurie has been involved in to this date:

Completion Date	Project description	Role	Client
2016-present	Strategic Environmental Assessment for the effective and efficient roll-out of large scale wind and solar energy projects in South Africa (Phase 2)	Project Manager	Department of Environmental Affairs
2016	Environmental Screening Study for the potential development of two Solar PV projects in the North West Province	Project Manager	Veroniva
2016	Basic Assessment process for the proposed construction of supporting electrical infrastructure to the Victoria West Wind Energy Facility, Victoria West, Northern Cape	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2016	Amendment application to the Victoria West renewable energy facility in order to add additional wind turbines to site, Victoria West, Northern Cape	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2015 - 2016	Scoping and Environmental Impact Assessment for 3 x 75 MW Solar PV facilities and associated electrical infrastructure near Kenhardt, Northern Cape a	Project Leader	Mulilo Renewable Project Development (Pty) Ltd
2015 - 2016	Scoping and Environmental Impact Assessment for 5 x 100 MW Solar PV facilities near Dealesville, Free State.	Project Leader	29Solar Capital
2015	Review of the validity of the appeals received against the EA issued for the construction of an 11 MW Hydro Power Station, Groblershoop, Northern Cape Province	Project Manager	Department of Environmental Affairs
2014 -2016	Integrated Scoping and EIA process for the development of twelve (12) Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Facilities with a generating capacity of 75 MW/100 MW each, near Dealesville, Free State.	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2014 - 2015	Integrated Scoping and EIA process for the construction of three Photovoltaic (PV) or Concentrated Photovoltaic (CPV)	Project Manager	Mulilo Renewable Project Development (Pty) Ltd

Completion Date	Project description	Role	Client
	Solar Facilities with a generating capacity of 75 MW each on the farms remaining extent of Portion 3 of the Farm Gemsbok Bult 120 and Boven Rugzeer remaining extent of 169, located 30 km north-east of Kenhardt. Two of the projects will be located on the farm remaining extent of Portion 3 of the Farm Gemsbok Bult 120 and one on Boven Rugzeer remaining extent 169.		
2013-2014	Basic Assessment for the construction of three additional petroleum storage tanks at the Cape Town Harbour.	Environmental Consultant	FFS Refiners (Pty) Ltd
2013-2014	Scoping and EIA for the construction of a Sewage Package Plant on Robben Island.	Environmental Consultant	Department of Public Works
2013	Development of an EMPr for the undertaking of maintenance work on the Stilbaai Fishing Harbour's Slipway located in Stilbaai, Western Cape, South Africa. In order to be compliant to the requirements of the National Environmental Management Act (Act 107 of 1998) and Environmental Impact Assessment (EIA) Regulations, a Maintenance Management Plan (MMP) needed to be developed to manage the environmental impacts associated with maintenance work that is scheduled to be undertaken on the Stilbaai Fishing Harbour's Slipway as well as any future on-going maintenance requirements.	Environmental Consultant	Department of Public Works
2012-2014	Waste Management License for the proposed storage of Ferrous HMS 1+2, Shredded Ferrous and Bales located at the K/L Berth at Duncan Road, Port of Cape Town	Environmental Consultant	The New Reclamation Group (Pty) Ltd
2012-2014	Scoping and EIA for the construction a biodiesel refinery in the Coega Industrial Development Zone (IDZ). The proposed project entails the import of used vegetable oil from the USA and converting it through	Environmental Consultant	FIS Biofuels (Ltd)

Completion Date	Project description	Role	Client
	various processes to biodiesel which will be exported to Europe. The proposed project requires an Air Emissions License, a Waste Management License and Environmental Authorisation.		
2013-2013	Basic Assessment for the proposed redevelopment of Berths B, C and D in Duncan Dock at the Port of Cape Town.	Assistant Environmental Consultant	FPT (Pty) Ltd
2011- 2012	Development of an EMPr for the Eerstelingsfontein Opencast Project (EOP).	Assistant Environmental Consultant	Exxaro Resources Limited
2011-2014	Basic Assessment for the proposed reinstatement of the Blue Stone Quarry located on Robben Island.	Assistant Environmental Consultant	Department of Public Works
2011	Scoping and EIA for the proposed upgrade to the Struisbaai WWTW.	Assistant Environmental Consultant	Cape Agulhas Municipality
2011	Basic Assessment for the construction of a cellular mast.	Environmental Consultant	MTN (Pty) Ltd
2010-2011	Basic Assessment for the construction of a Heritage Centre.	Environmental Consultant	Waenhuiskrans Arniston Community Development Trust
2010-2011	Scoping and EIA for the rezoning of the area from open space to residential, the construction of six residential units and the upgrading of the existing Waste Water Treatment Plant.	Environmental Consultant	Private developer

EMPLOYMENT RECORD

- **2014 to present** Project Manager- Environmental Assessment Practitioner. Council for Scientific and Industrial Research – Environmental Management Services (EMS) - Stellenbosch
- **2011 to 2014** Environmental Consultant. WSP Environmental (Pty) Ltd - Gauteng
- **2010 to 2011** Junior Environmental Consultant - Somerset West

QUALIFICATIONS/EDUCATION

- Postgraduate Certificate Environmental Economics (University of London)
- Project Management Course (University of Cape Town Graduate School of Business)
- MPhil Environmental Management (University of Stellenbosch)
- BSc Conservation Ecology (University of Stellenbosch)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

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Curriculum Vitae of Kelly Stroebel – Project Manager (*Cand. Sci. Nat.)*

Name of firm	CSIR
Name of staff	Kelly Stroebel
Profession	Environmental Assessment Practitioner
Position in firm	Environmental Assessment Practitioner
Years' experience	4 years
Nationality	South African

Biographical Sketch

Kelly holds a Bachelor of Science with Honours in Environmental Science from Rhodes University in Grahamstown and is currently pursuing a Masters at the University of Stellenbosch. Her undergraduate degree was a Bachelor of Science with majors in Environmental Science and Zoology. She is currently working as an environmental assessment practitioner at the Council for Scientific and Industrial Research (CSIR). Kelly has been the Project Manager of several EIA's in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA as SEA which were commissioned by the national Department of Environmental Affairs. On a personal level, Kelly enjoys the outdoors, traveling and SCUBA diving and is passionate about the field of environmental science and management.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Kelly Stroebel has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**EIA's in the South African energy sector**	Project Manager/EAP	Private energy companies and organs of state
In progress	**Special Needs and Skills Development Programme (DEA-CSIR)**	Project Manager conducting Environmental services such as basic Assessments and Environmental Screening Studies.	Various SMME's and Community Trusts
2015	**Strategic Environmental Assessment (SEA)** for Electricity	Project member-stakeholder engagement and project support.	National Department of Environmental

Completion Date	Project description	Role	Client
	Grid Infrastructure		Affairs
2015	**EIA for two proposed Desalination plants on the KZN coast.**	Project member- Public Participation Process, stakeholder engagement and project support.	Umgeni Water
August 2014	**National Strategy for Sustainable Development Review (NSSD1)**	Project member- research and report development.	National Department of Environmental Affairs
2013-2014	**Strategic Environmental Assessment (SEA)** for roll out of photovoltaic solar and wind energy in South Africa.	Project member- Stakeholder engagement and project support	National Department of Environmental Affairs

EMPLOYMENT RECORD

- **2015 to present** Environmental Scientist and Assessment Practitioner. Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2014** Environmental Scientist and Assessment Practitioner (Intern). Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2013** Environmental Education Counselor - Fernwood Cove Summer Camp, USA.
- **2012** Graduate Assistant: Rhodes University Department of Environmental Science.
- **2011** Vacation Internship: Environmental Management Department of Mittal Steel, Newcastle.
- **2011** Vacation Internship: Northern Kwa-Zulu Natal branch of WWF.

QUALIFICATIONS/EDUCATION

- BSc Hons. Environmental Science (Rhodes University, Grahamstown, South Africa)
  - Honours modules including Environmental Impact Assessment, Statistics, Climate Change Adaptation, Urban Ecology and Environmental Water Quality.
  - Honours thesis: "Water use and conservation by households of different economic status in King Willliam's Town"
- Bachelor of Science with Distinction (Rhodes University, Grahamstown, South Africa)
  - Undergraduate courses including Environmental Science, Zoology, Ichthyology, Chemistry, Earth Science, Botany and Computer Science.
- IEB Matric Certificate, 5 Distinctions (St Dominic's Academy, Newcastle)

TRAINING, CONFERENCES AND PROFFESIONAL REGISTRATIONS

- Member of the Conference Organizing Committee (COC) for the IAIAsa Annual Conference 2017
- Project Management Practices and Principles with MS projects with the University of Pretoria: Distinction obtained (2016)
- Introduction to Earth Observation using ENVI with the University of Stellenbosch (2016)
- Public Participation Course with IAP2 (2016)
- Conflict Management Accredited through Conflict Dynamics (2015)
- Media and Science Training Accreditation through Jive Media Africa (2015)
- IAIA WC Workshop for Integrating Climate Change into EIA practice (2015)
- Presented on the DEA-CSIR "Special Needs and Skills Development Programme" at the 2014 & 2015 Annual IAIA (International Association for Impact Assessment) South Africa Conference.

- Environmental Impact Assessment Training Course accreditation through Coastal and Environmental Services, Grahamstown (2012)
- DEA&DP Training on the EIA Regulations (2014)
- Registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Reg #: 100151/14)
- Member of the South African Affiliate of the International Association for Impact Assessment (Membership no: 3588)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

CSIR
Jan Cilliers Street
PO Box 320
Stellenbosch 7600
South Africa

Phone: +27 21 888 2432
Fax: +27 21 888 2693
Email: bmqokeli@csir.co.za

Curriculum Vitae of Babalwa Mqokeli – Project Manager (*Cand. Sci. Nat.)*

Name of firm	CSIR
Name of staff	Babalwa Mqokeli
Profession	Environmental Assessment Practitioner
Position in firm	Junior Environmental Assessment Practitioner
Years' experience	2 years
Nationality	South African

Biographical Sketch

Babalwa holds a Masters degree in Ecological Science from the University of KwaZulu-Natal. She has 2 years of experience in the environmental management field, as an ecological scientist. She is currently working as an environmental assessment practitioner at the Council for Scientific and Industrial Research (CSIR). Babalwa has been a Project Manager for a variety of Basic Assessment projects in the mining and agricultural sector, under the DEA-CSIR Special Needs and Skills Development Programme. She is currently assisting in a solar energy EIA, as a Project Officer. Babalwa is passionate about environmental management and planning.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Babalwa Mqokeli has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**EIA's in the South African energy sector**	Project member	Private energy companies and organs of state
In progress	**Special Needs and Skills Development Programme (DEA-CSIR)**	Project Manager conducting Environmental services such as basic Assessments and Environmental Screening Studies for agricultural and mining projects.	Various SMME's and Community Trusts
In progress	**Strategic Environmental Assessment (SEA)** for Renewable Energy Development Zones	Project member-stakeholder engagement and project support.	National Department of Environmental Affairs
In progress	**Permit Application Process for *Boscia albitrunca* (Shepherd's Tree)**	Project member	North West Department of Economic and Enterprise Development

EMPLOYMENT RECORD

- **2017 to present** Environmental Assessment Practitioner. Council for Scientific and Industrial Research – Environmental Management Services (EMS) Unit - Stellenbosch
- **2015** Environmental Assessment Practitioner (Intern). Council for Scientific and Industrial Research – Environmental Management Services (EMS) Unit - Stellenbosch
- **2015** Biology 101 Teacher Assistant. University of KwaZulu-Natal - Pietermaritzburg
- **2013** Conservation Research Intern. Nature's Valley Trust (WWF-SA Environmental Leaders Programme) - Plettenberg Bay.

QUALIFICATIONS/EDUCATION

- MSc Ecological Science (University of KwaZulu-Natal, Pietermaritzburg, South Africa)
- BSc Hons. Ecological Science (University of KwaZulu-Natal, Pietermaritzburg, South Africa)
- BSc Biological Science (University of Zululand, Empangeni, South Africa)
    - Undergraduate courses including Integrated Environmental Management, Aquatic Conservation & Management, Animal Ecology (Terrestrial, Freshwater & Marine), Risk Assessment & Ecotoxicology, Environmental Law & Waste Management, Introduction to Surface Water Hydrology, Botany.
- Matric Certificate (Durban Girls' Secondary School, Durban)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
IsiXhosa	Excellent	Excellent	Excellent
IsiZulu	Excellent	Excellent	Excellent
Afrikaans	Poor	Moderate	Moderate

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX B:

Declaration of the Environmental Assessment Practitioner

APPENDIX 9
DECLARATION OF THE EAP

I, Kelly Stroebel declare that –

General declaration:

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 48 of the Regulations and is punishable in terms of section 24F of the Act.

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Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

____

____

____

____

Signature of the environmental assessment practitioner:

CSIR

Name of company:

15/09/2017

Date:

APPENDIX 9

9.2 UNDERTAKING UNDER OATH/ AFFIRMATION

I, Kelly Stroebel, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the environmental assessment practitioner

CSIR

Name of company

15/09/2017

Date

BRANCH MANAGER

2017 -09- 15

7599 STELLENBOSCH

TAKBESTUURDER

"I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have an objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me and that the administering oath complied with the regulations contained in Government Gazette No. R 1258 of 21 July 1972, as amended.

SIGNATURE

FULL NAMES Antoinette Kotze

Commissioner of Oaths

Designation: BRANCH MANAGER ex officio: Republic of South Africa

Date: 15/9/17

Place: Stellenbosch

Business Address: Cnr Bird & Plein Str Stellenbosch

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DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX C:

Database of Interested and Affected Parties

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement and Release of Draft Scoping Reports	Email: Notice of Submission of Scoping Reports to DEA	Notice of Release of Draft EIA Reports and BA Report	Email: Notice of Submission of EIA Reports and BA Report to DEA	Notice of EA for BAs and EIAs
Organs of State								
1.	Mmatlala	Rabothatha	National DEA: Integrated Environmental Authorisations	✓	✓			
2.	Muhammad	Essop	National DEA: Integrated Environmental Authorisations	✓	✓			
3.	Wilma	Lutsch	National DEA: Biodiversity and Conservation	✓	✓			
4.	Skumsa	Mancotywa	National DEA: Protected Areas Unit		✓			
5.	Herman	Alberts	National DEA: Integrated Environmental Authorisations	✓	✓			
6.	A	Yaphi	Provincial Department of Environment and Nature Conservation (DENC): Northern Cape	✓	✓			
7.	M	Mathews	Provincial DENC: Northern Cape	✓	✓			
8.	Samantha	De la Fontaine	Provincial DENC: Northern Cape	✓	✓			
9.	Elsabe	Swart	Provincial DENC: Northern Cape	✓	✓			
10.	Sibonelo	Mbanjwa	Provincial DENC: Northern Cape	✓	✓			
11.	Luzane	Tools-Bernado	Provincial DENC: Northern Cape	✓	✓			
12.	Eric	Ngxanga	ZF Mgcawu District Municipality - Municipal Manager	✓	✓			
13.	Frikkie	Ruping	ZF Mgcawu District Municipality - Environmental Manager	✓	✓			
14.	H.T	Scheepers	!Kheis Municipality - Municipal Manager	✓	✓			
15.	Gloria	Matlakala	!Kheis Municipality	✓	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement and Release of Draft Scoping Reports	Email: Notice of Submission of Scoping Reports to DEA	Notice of Release of Draft EIA Reports and BA Report	Email: Notice of Submission of EIA Reports and BA Report to DEA	Notice of EA for BAs and EIAs
16.	JG	Lategan	Kai ! Garib Municipality - Municipal Manager	✓	✓			
17.	M.	Clarke	Kai ! Garib Municipality - Manager: Electromechanical Services	✓	✓			
18.	Mashudu	Randwedzi	Department of Water and Sanitation	✓	✓			
19.	Melinda	Mei	Department of Water and Sanitation	✓	✓			
20.	Shaun	Cloete	Department of Water and Sanitation	✓	✓			
21.	Chantèl	Schwartz	Department of Water and Sanitation	✓	✓			
22.	Mandla	Ndzilili	Ministry of Environment and Nature Conservation	✓	✓			
23.	Mashudu	Marubini	National Department of Agriculture, Forestry and Fisheries (DAFF)	✓	✓			
24.	Thoko	Buthelezi	National DAFF - AgriLand Liaison office	✓	✓			
25.	D	Nhlakad	National DAFF - AgriLand Liaison office	✓	✓			
26.	Anneliza	Collett	National DAFF - AgriLand Liaison office	✓	✓			
27.	H. J.	Buys	National DAFF (Land Use and Soil Management)	✓	✓			
28.	Jacoline	Mans	Provincial DAFF	✓	✓			
29.	Khuthala	D.	DAFF	✓	✓			
30.	Ali	Diteme	Provincial Department of Agriculture, Land Reform & Rural Development	✓	✓			
31.	Pieter	Buys	National Energy Regulator of South Africa	✓	✓			
32.	IA	Bulane	Department of Public Works, Roads and Transport	✓	✓			
33.	Denver	Van Heerden	Department of Public Works, Roads and Transport	✓	✓			
34.	Rene	de kock	South African Roads Agency Limited - Northern Cape (Western Region)	✓	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement and Release of Draft Scoping Reports	Email: Notice of Submission of Scoping Reports to DEA	Notice of Release of Draft EIA Reports and BA Report	Email: Notice of Submission of EIA Reports and BA Report to DEA	Notice of EA for BAs and EIAs
35.	Nicole	Abrahams	South African Roads Agency Limited (Western Region)	✓	✓			
36.	M	Lepheane	Department of Labour	✓	✓			
37.	A	Botes	Department of Social Development	✓	✓			
38.	Riaan	Warie	Northern Cape Economic Development Agency	✓	✓			
39.	Andrew	Timothy	Directorate Heritage, Department - Sports, Arts and Culture	✓	✓			
40.	Lizell	Stroh	South African Civilian Aviation Authority	✓	✓			
41.	John	Geeringh	ESKOM	✓	✓			
42.	Kevin	Leask	ESKOM	✓	✓			
43.	Justine	Wyngaardt	ESKOM (Western Operating Unit, Distribution)	✓	✓			
44.	Lindi	Haarhoff	ESKOM (Nieuwehoop Substation)	✓	✓			
45.	Sharon	Steyn	Northern Cape Chamber of Commerce and Industry	✓	✓			
46.	P.J.J	van Rensburg	Agri Northern Cape	✓	✓			
47.	H.	Myburgh	Agri Northern Cape	✓	✓			
48.	Adrian	Tiplady	SKA SA	✓	✓			
49.	Marina	Lourens	Transnet Freight Rail	✓	✓			
50.	Gilbert	Nortier	Transnet Freight Rail	✓	✓			
51.	Mayvyn	Bhana	Transnet	✓	✓			
52.	Clive	Stephenson	Transnet	✓	✓			
53.	Director		Department of Energy Northern Cape	✓	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement and Release of Draft Scoping Reports	Email: Notice of Submission of Scoping Reports to DEA	Notice of Release of Draft EIA Reports and BA Report	Email: Notice of Submission of EIA Reports and BA Report to DEA	Notice of EA for BAs and EIAs
54.	Ragna	Redelstorff	South African Heritage Resources Agency[1]	✓	✓			
55.	Natasha	Higgitt	South African Heritage Resources Agency	✓	✓			
56.	Kgauta	Mokoena	Department of Mineral Resources	✓	✓			
57.	Elliot	Sibeko	Department of Telecommunication & Postal Services	✓	✓			
58.	Director		Department of Communications	✓	✓			
59.	Chris	Coetzee	Southern African Large Telescope (SALT) Sutherland	✓	✓			
60.	Raoul	Van den Berg	Southern African Large Telescope (SALT) Sutherland	✓	✓			
Stakeholders (NGOs and Conservation Organisations)								
61.	Simon	Gear	Birdlife South Africa	✓	✓			
62.	Janine	Goosen	Birdlife South Africa	✓	✓			
63.	Lubabalo	Ntsolo	C.A.P.E. Co-ordination Unit: Northern Cape	✓	✓			
64.	Freyni	du Toit	Grasslands Society of Southern Africa	✓	✓			
65.			Endangered Wildlife Trust, Wildlife and Energy Programme	✓	✓			
66.	Dr. Howard	Hendricks	South African National Parks - Snr GM: Policy & Governance Conservation Services Division	✓	✓			
67.	Dr. Joh R	Henschel	SAEON Arid Lands Node	✓	✓			
68.	Praneel	Ruplal	Independent Communications Authority of South Africa (ICASA)	✓	✓			

[1] Note that submissions to the South African Heritage Resources Agency (SAHRA) have been made via the online SAHRIS. The details provided are those of the designated case officer assigned to the application.

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement and Release of Draft Scoping Reports	Email: Notice of Submission of Scoping Reports to DEA	Notice of Release of Draft EIA Reports and BA Report	Email: Notice of Submission of EIA Reports and BA Report to DEA	Notice of EA for BAs and EIAs
Landowner/Adjacent Landowners								
69.	P	Karsten	Landowner	✓	✓			
70.	D	Strauss	Landowner	✓	✓			
71.	H	Van Wyk	Landowner	✓	✓			
Additional I&APs								
72.	Mitchell	Hodgson	Scatec Solar	✓	✓			
73.	Claude	Bosman	Veroniva (PTY) Ltd - Renewable Energy	✓	✓			
74.	Karen	Low	Mulilo Renewable Energy Developments	✓	✓			

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX D:

Copy of Newspaper Advertisements

Newspaper Advertisement – The Gemsbok

KENNISGEWING VAN OMGEWINGSIMPAKEVALUERINGPROSESSE VIR DIE ONTWIKKELING VAN DRIE FOTOVOLTAïSE SONKRAGAANLEGTE EN GEASSOSIEERDE ELEKTIESE INFRASTRUKTUUR, NOORD-OOS VAN KENHARDT IN DIE NOORD-KAAP

Kennis word hierdeur gegee in terme van die NEMA Omgewings Impak Asseserings (EIA) Regulasies onder sub-regulasie 41 (2) (a) gepromulgeer in Staatskoerant No. 40772 van 7 April 2017 van die Nasionale Wet op Omgewingsbestuur (Wet 107 van 1998, soos gewysig) (NEMA), dat juwi Renewable Energies' (Pty) Ltd (die Aansoeker) van voorneme is om drie fotovoltaïese (FV) sonkragaanlegte met 'n opwekkingsvermoë van 100 MW elk en elektriese infrastruktuur op te rig naby Kehardt in die Noord Kaap. Die elektirese komponent sal geassesseer word as deel van 'n aparte Basiese Bestekopname Proses. Die voorgestelde fasiliteite sal opgerig word op Gedeeltes 0 van Smutshoek Plaas 395 en Gedeelte 9 van Gemsbok Bult Plaas 120, geleë ongeveer 43 km noord oos van Kenhardt. Die voorgestelde kraglyne (132 kV kraglyn vir elke 100 MW sonkrag fasiliteit) sal aansluit by die Nieuwehoop Substasie.

In terme van die Nasionale Wet op Omgewingsbestuur (Wet 107 van 1998, soos gewysig) (NEMA) en die NEMA Omgewings Impak Asseserings (EIA) Regulasies gepromulgeer in Staatskoerant No. 40772 en Staatskennisgewing (GNR) 324 en 327 op 7 April, vereis die beoogde projekte dat Omvangsbepaling-en Omgewingsevaluering (OIE) prosesse onderneem moet word sowel as 'n aparte Basiese Bestekopname proses vir die kraglyne.

Die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) is deur juwi aangestel om die vereiste prosesse te onderneem.

U word hiermee genooi om as 'n belangstellende en/of geaffekteerde party te registreer **(teen nie later as 23 Oktober 2017 nie)**. Dit sal ons in staat stel om u op ons projek databasis by te voeg en ook sodat u enige kommentaar of kwelpunte aangaande die projek kan opper. Hierdie kommentaar sal by die Omvangsbepalingsverslag en Basiese Bestekopname verslag ingesluit word.

Vir verdere inligting en/of om as 'n belangstellende en geaffekteerde party te registreer, kontak:

Ms Kelly Stroebel (Omgewings Impak Asseserings Konsultant van WNNR (CSIR)

Posadres: Posbus 320, Stellenbosch, 7599 // **Tel**:(021) 888 2432//**Faks**:(021) 888 2693//

e-pos: kstroebel@csir.co.za

6 OKTOBER 2017 DIE GEMSBOK BLADSY 19

'Vrye onderrig, toegeruste onderwysers' hoeksteen van onderwys

GEMSBOK-UPINGTON: Vanjaar se viering van Wêreldonderwysersdag het "Vrye onderrig, toegeruste onderwysers" as tema, met die fokus op die institusionele outonomie en akademiese vryheid van onderwysers.

Ek Praat Prontuit

Deur Mérie Scheepers

Is dit te veel gevra?

GEMSBOK-UPINGTON: As 'n mens deur Upington ry, sal jy maklik sê dit is 'n mooi dorp. Die paaie in die middedorp is sonder slaggate en die grasperke van die parke is skoon en netjies met lopende sproeiers en 'n mens is al die tyd bewus daarvan dat ons langs die rivier woon.

KENNISGEWING VAN OMGEWINGSIMPAKEVALUERINGPROSESSE VIR DIE ONTWIKKELING VAN DRIE FOTOVOLTAÏSE SONKRAGAANLEGTE EN GEASSOSIEERDE ELEKTRIESE INFRASTRUKTUUR, NOORD-OOS VAN KENHARDT IN DIE NOORD-KAAP

juwi CSIR

Note from the CSIR: The Gemsbok is a weekly Afrikaans newspaper which is distributed every Wednesday and made available from Wednesday to Friday; it is dated for a Friday (in this case, 6 October 2017).

ENGLISH TRANSLATION OF NEWSPAPER ADVERTISMENT ABOVE

NOTICE OF BASIC ASSESSMENT AND SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESSES

THE PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC FACILITIES AND ASSOCIATED ELECTRICAL INFRASTRUCTURE, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

Notice is given in terms of the Environmental Impact Assessment (EIA) Regulations, under sub-regulation 41 (2) (a), published in Government Gazette (GG) No 40772 of 7 April 2017, of the National Environmental Management Act 1998 (Act No. 107 of 1998, as amended) (NEMA), that juwi Renewable Energies' (Pty) Ltd (hereinafter referred to as "juwi") proposes to construct and operate 3 x 100 Megawatt (MW) Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (subject to a separate Basic Assessment Process) near Kenhardt in the Northern Cape Province. The proposed Facilities will be constructed on two land portions, namely Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120, located approximately 43 km north-east of Kenhardt. The proposed Solar Facilities will be connected to the Nieuwehoop Substation via a 132 kV transmission line for each 100 MW Facility.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the NEMA EIA Regulations published in Government Notice Regulation (GNR) 324 and 327 on 7 April 2017 Government Gazette No 40772, the proposed projects require full Scoping and EIA Processes as well as a separate BA process.

To ensure that you are included on the project register as an Interested and Affected Party (I&AP), as well as to raise any issues and concerns for inclusion in the Scoping/EIA Reports, you are kindly requested to register your interest in the projects and submit any comments you may have to the CSIR (at the details indicated below): **Ms. Ms Kelly Stroebel, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: kstrobel@csir.co.za**. You have until on or before **23 October 2017** to do so (30 days from the date of this publication - including weekends, but excluding public holidays).

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX E:

Copies and Proof of Correspondence sent to I&APs

CONTENTS

Copies and Proof of Correspondence Sent to I&APs for the Project Initiation as well as Release of Draft Scoping Report for Review

CSIR Environmental Management Services
P. O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2472
Email: kstroebel@csir.co.za

CSIR
our future through science

20 September 2017

Dear Interested and Affected Party

RE: RELEASE OF DRAFT SCOPING REPORTS FOR THE PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC (PV) FACILITIES (REFERRED TO AS SKEERHOK PV 1, SKEERHOK PV 2 AND SKEERHOK PV 3) ON PORTION 9 OF GEMSBOK BULT 120 AND PORTION 0 OF SMUTSHOEK 395, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

juwi Renewable Energies (PTY) Ltd (i.e. "juwi") is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (including 132 kV transmission lines for all three 100 MW facilities) on Portion 9 of Gemsbok Bult 120 and Portion 0 of Smutshoek 395, and the connection points to the Eskom Nieuwehoop Substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120, approximately 70 km south of Upington and 43 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the three Solar PV facilities. A separate Basic Assessment Process will be undertaken for the development of the proposed transmission lines, associated electrical infrastructure and connection to the Eskom Nieuwehoop Substation. The Council for Scientific and Industrial Research (CSIR) has been appointed by the Project Applicant to undertake the separate required Basic Assessment and Scoping and EIA Processes for the proposed projects.

The proposed 100 MW Solar PV facility projects (requiring a Scoping and EIA Process) and the Basic Assessment project are referred to as:

Scoping and EIA Processes: Proposed 75 MW Solar PV Facilities	Basic Assessment Processes: Proposed 132 kV Transmission Lines and Associated Electrical Infrastructure
▪ Skeerhok PV 1 ▪ Skeerhok PV 2 ▪ Skeerhok PV 3	▪ Skeerhok PV – Transmission Line

Table 1 below indicates the Project Applicant details, as well as brief project details.

Table 1: Details of the Scoping and EIA Projects

Project Reference	Project Applicant	Generation Capacity	Project Footprint	Available Development Area
Skeerhok PV 1	juwi Renewable Energies (PTY) Ltd	100 MW	300 ha	400 ha
Skeerhok PV 2		100 MW	300 ha	570 ha
Skeerhok PV 3		100 MW	300 ha	350 ha

juwi is an integrated independent power producer that is focused on making solar energy a sustainable and affordable source on a global scale. Linked to enhancing its operations within South Africa, each 100 MW Solar PV facility will cover an approximate area of 300 ha (as noted in Table 1 above). The area available to develop at the preferred sites exceeds the required project footprint area, and therefore there is scope to avoid major environmental constraints through the final design and layout of the facility. The proposed projects will entail the construction of a solar field, buildings, electrical infrastructure, internal access roads, and associated infrastructure and structures.

Since the proposed 100 MW Solar PV facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Scoping and EIA project and will be lodged for the Basic Assessment project. Furthermore, separate reports (i.e. Basic Assessment and Scoping and EIA Reports) will be compiled for each project. The Basic Assessment Report will be made available for Interested and Affected Party (I&AP) and stakeholder review together with the EIA Reports.

In line with the above, as a registered I&AP on the project database, you are hereby notified of the release of the Scoping Reports for the Skeerhok PV 1, Skeerhok PV 2 and Skeerhok PV 3 projects to all registered I&APs and stakeholders for a 30-day review period, which will extend from **20 September 2017 to 23 October 2017.**

Hard copies of the Scoping Reports are available for public viewing at the Kenhardt Library (in Park Street). The Draft Scoping Reports can also be downloaded from the following website: https://www.csir.co.za/environmental-impact-assessment

All comments received during this 30 day review period will be recorded and included in the Final Scoping Reports for submission to the National DEA for decision-making in line with Regulations 21 and 22 of the 2014 EIA Regulations (GN R326). As a registered I&AP on the project database, you will be notified of the submission of the Final Scoping Reports to the DEA for decision-making.

Should you have any queries or require additional information please do not hesitate to contact the undersigned using the contact details provided above.

Sincerely,

Surina Laurie
Project Leader
CSIR Environmental Management Services

Kelly Stroebel
Project Manager
CSIR Environmental Management Services

Email sent to all I&APs on 20 September 2017

From: Kelly Stroebel
To:
BC MRabothata@environment.gov.za; HAlberts@environment.gov.za; wlutsch@environment.gov.za; oriba@ncpg.gov.za; mmathews@ncpg.gov.za; sdelafontaine@gmail.com; elsabe.dtec@gmail.com; sb@siyanda.gov.za; fpr@bodr.gov.za; teresascheepers@vodamail.co.za; gloria.tlaky@gmail.com; mm@kaigarib.gov.za; clarkem@kaigarib.gov.za; MeiM@dwa.gov.za; CloeteS@dws.gov.za; SchwartzC@dws.gov.za; mndzilili@ncpg.gov.za; smbanjwa@ncpg.gov.za; ltoolsbernado@ncpg.gov.za; MashuduMa@daff.gov.za; ThokoB@daff.gov.za; nhlakad@daff.gov.za; annelizac@nda.agric.za; JacolineMa@daff.gov.za; aditeme@agri.ncape.gov.za; peter.buys@nersa.org.za; klawrence@trpw.ncape.gov.za; waltjc@nra.co.za; AbrahamsN@nra.co.za; monica.lepheane@labour.gov.za; rwarie@ncpg.gov.za; ratha.timothy@gmail.com; strohl@caa.co.za; GeerinJH@eskom.co.za; LeaskK@eskom.co.za; WyngaaJO@eskom.co.za; HaarhL@eskom.co.za; sharon@nocci.co.za; atiplady@ska.ac.za; Marina.Lourens@transnet.net; Gilbert.Nortier@transnet.net; Mayvyn.Bhana@transnet.net; Clive.Stephenson@transnet.net; rredelstorff@sahra.org.za; Kgauta.Mokoena@dmr.gov.za; esibeko@dtps.gov.za; chris@salt.ac.za; raoul@salt.ac.za; advocacy@birdlife.org.za; l.ntsolo@sanbi.org.za; admin@grasslands.org.za; wep@ewt.org.za; joh.henschel@saeon.ac.za; pruplal@icasa.org.za; pietk@karsten.co.za; straussdj@stocksandstrauss.com; vanwyk88@hotmail.com; mitchell.hodgson@scatecsolar.com; claude@veroniva.co.za; karen@mulilo.com; Babalwa Mqokeli; Cleo Forster; Surina Laurie; howard.hendricks@sanparks.org; ncagric@worldonline.co.za; ontvang@agric.co.za; ptiger@ncpg.gov.za
Date: 18/09/2017 11:23
Subject: juwi Skeerhok PV projects; release of DSR's for public comment
Attachments: CSIR Letter to I&APs_juwi Skeerhok PV projects.pdf

Dear Stakeholder,

RE: release of Draft scoping reports for the Proposed development of three Solar Photovoltaic (PV) Facilities (referred to as Skeerhok pv 1, Skeerhok pv 2 and Skeerhok pv 3) on Portion 9 oF GEMSBOK BULT 120 AND PORTION 0 OF SMUTSHOEK 395, north-east of Kenhardt, Northern Cape Province

Please see attached letter notifying you of the availability of the three above-mentioned Draft Scoping Reports for public comment. In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the three Solar PV facilities. (CSIR) has been appointed by the Project Applicant (juwi Renewable Energies (Pty) Ltd) to undertake the separate required Basic Assessment and Scoping and EIA Processes for the proposed projects.
Hard copies of the Scoping Reports are available for public viewing at the Kenhardt Library (in Park Street). The Draft Scoping Reports can also be downloaded from the following website: https://www.csir.co.za/environmental-impact-assessment

The comment period extends from Wednesday 20th September 2017 to Monday 23rdOctober 2017. Please submit any comments on the DSR's to the CSIR project manager (contact details below) by the 23rd October 2017.
Kindly contact the undersigned for further information or for any queries relating to the above.
Kind Regards,

Kelly Stroebel
Environmental Assessment Practitioner (EAP)
CSIR Stellenbosch

kstroebel@csir.co.za
Tel. : 021 888 2432
PO Box 320, Stellenbosch, 7599

Proof of Delivery of Email sent to all I&APs on 20 September 2017

Message Id:	59BF90AA.8AD : 70 : 17837
Subject:	juwi Skeerhok PV projects; release of DSR's for public comment
Created By:	KStroebel@csir.co.za
Scheduled Date:	
Creation Date:	18/09/2017 11:23
From:	Kelly Stroebel

Recipients:

Recipient	Action	Date & Time
agri.ncape.gov.za	Transferred	20/09/2017 09:00
BC: aditeme@agri.ncape.gov.za(aditeme@agri.ncape.gov.za)		
agric.co.za	Transfer Failed	20/09/2017 09:00
BC: ontvang@agric.co.za(ontvang@agric.co.za)	Undeliverable	20/09/2017 09:00
birdlife.org.za	Transferred	20/09/2017 09:01
BC: advocacy@birdlife.org.za(advocacy@birdlife.org.za)		
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BC: nhlakad@daff.gov.za(nhlakad@daff.gov.za)		
BC: ThokoB@daff.gov.za(ThokoB@daff.gov.za)		
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BC: CloeteS@dws.gov.za(CloeteS@dws.gov.za)		
BC: SchwartzC@dws.gov.za(SchwartzC@dws.gov.za)		
environment.gov.za	Transferred	20/09/2017 09:00
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BC: gloria.tlaky@gmail.com(gloria.tlaky@gmail.com)		
BC: ratha.timothy@gmail.com(ratha.timothy@gmail.com)		
BC: sdelafontaine@gmail.com(sdelafontaine@gmail.com)		
grasslands.org.za		20/09/2017 09:00

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worldonline.co.za	Transferred
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BC: AbrahamsN@nra.co.za(AbrahamsN@nra.co.za)		

BC: Babalwa Mqokeli(BMqokeli@csir.co.za)	Read	20/09/2017 10:35
BC: Surina Laurie(SLaurie@csir.co.za)	Third-Party Downloaded Read	20/09/2017 09:00 20/09/2017 09:00
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BC: Clive.Stephenson@transnet.net(Clive.Stephenson@transnet.net)		
BC: Gilbert.Nortier@transnet.net(Gilbert.Nortier@transnet.net)		
BC: Marina.Lourens@transnet.net(Marina.Lourens@transnet.net)		
BC: Mayvyn.Bhana@transnet.net(Mayvyn.Bhana@transnet.net)		
trpw.ncape.gov.za	Transfer Failed	20/09/2017 09:00
BC: klawrence@trpw.ncape.gov.za(klawrence@trpw.ncape.gov.za)	Undeliverable	20/09/2017 09:00

Proof of Delivery of hard copies of each report (Courier Waybills and Receipt of Hard Copy)

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2718308488

DATE	ACCOUNT NUMBER	COST CENTRE	SHIPPER'S REFERENCE	ORIGIN	DESTINATION	No. OF PIECES
18-9-17	P01521		EMS0140 /RLW 02100/021 SE			1

SHIPPER: (YOUR NAME) Kelly Stroebel
COMPANY NAME: CSIR - STELLENBOSCH
STREET ADDRESS: 11 JAN CILLIERS STR
STELLENBOSCH
CITY: CAPE TOWN
COUNTRY: RSA
POST/ZIP CODE: 7599
TELEPHONE NUMBER & E-MAIL: 021 888 2400

TO: (RECIPIENT'S NAME) Muhammad Essop
COMPANY NAME: Nat Dept of Environmental Affairs
STREET ADDRESS: Integrated Env Authorisations; Environment House; 473 Steve Biko Rd
CITY: Arcadia, Pretoria
COUNTRY: S.A.
POST/ZIP CODE: 0001
TELEPHONE NUMBER & E-MAIL: 012-399 9406

INTERNATIONAL SERVICES: GLOBAL DOCUMENT EXPRESS; GLOBAL PARCEL EXPRESS; SPECIALS; AIRFREIGHT; CROSS BORDER ROAD FREIGHT
DOMESTIC SERVICES: OVERNIGHT EXPRESS; IN CITY DELIVERY; BUDGET CARGO 21-48 HRS; ROAD FREIGHT 48-96 HRS
DOMESTIC SERVICES: SAME DAY; DAWN DELIVERY BY 09H00; SATURDAY DELIVERY; AFTER HOURS; PUBLIC HOLIDAY

CUSTOMS VALUE
HAZARDOUS CARGO? YES NO
INSURANCE YES NO
AMOUNT:

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE OF GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME: A TAYLOR
SIGNATURE: ATaylor
DATE: 18-9-17 TIME:

RECEIVED BY GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME:
SIGNATURE:
DATE: 18/9/17 TIME:

RECEIVED IN GOOD ORDER AND CONDITION
PRINT NAME:
CONSIGNEE SIGNATURE:
DATE: TIME:

ACTUAL WEIGHT
PIECES: 1 — DIMENSIONS: X X
IMPORT & EXPORT CODE
SPECIAL INSTRUCTIONS
DESCRIPTION OF CONTENTS: Documents

Globeflight reserves the right to choose the service "Budget" should no service label be selected

Please note indemnity clause in Terms & Conditions.

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2718308489

DATE	ACCOUNT NUMBER	COST CENTRE	SHIPPER'S REFERENCE	ORIGIN	DESTINATION	No. OF PIECES
-17	P01521		EMS0140 /RLW 02100/021 SE			1

(YOUR NAME) Kelly Stroebel
NAME: STELLENBOSCH
ADDRESS: CILLIERS STR
BOSCH
WN
POST/ZIP CODE: 7599
NUMBER & E-MAIL: 88 2400

TO: (RECIPIENT'S NAME) Ordain Riba
COMPANY NAME: Provincial Dept of Environment + Nature Conserv
STREET ADDRESS: N/Cape; Sasko Building; 90 Long Street
CITY: Kimberley
COUNTRY: S.A.
POST/ZIP CODE: 8301
TELEPHONE NUMBER & E-MAIL: 053-831 3530

DOCUMENT EXPRESS; PARCEL EXPRESS; S; GHT; BORDER ROAD FREIGHT
DOMESTIC SERVICES: OVERNIGHT EXPRESS X; IN CITY DELIVERY; BUDGET CARGO 21-48 HRS; ROAD FREIGHT 48-96 HRS
DOMESTIC SERVICES: SAME DAY; DAWN DELIVERY BY 09H00; SATURDAY DELIVERY; AFTER HOURS; PUBLIC HOLIDAY

TOMS VALUE
YES NO
YES NO

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE OF GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME: A TAYLOR
SIGNATURE: ATaylor
DATE: 18-9-17 TIME:

RECEIVED BY GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME:
SIGNATURE:
DATE: 18/9/17 TIME:

RECEIVED IN GOOD ORDER AND CONDITION
PRINT NAME:
CONSIGNEE SIGNATURE:
DATE: TIME:

ACTUAL WEIGHT
PIECES: 1 — DIMENSIONS: X X
IMPORT & EXPORT CODE
SPECIAL INSTRUCTIONS
DESCRIPTION OF CONTENTS: Documents

rves the right to choose the service "Budget" should no service label be selected

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beflight

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www.globeflight.com
Reg. No. 1996/009052/07 / VAT NO: 4650175351

2718308490

TE	ACCOUNT NUMBER	COST CENTRE	SHIPPER'S REFERENCE	ORIGIN	DESTINATION	No. OF PIECES
?-17	P01521		EMS0140/RLW 02100/021 SC			1

ACTUAL WEIGHT

YOUR NAME) Kelly Stroebel

NAME: STELLENBOSCH

DRESS: CILLIERS STR

NBOSCH

OWN

POST/ZIP CODE: 7599

E NUMBER & E-MAIL: 888 2400

TO: (RECIPIENT'S NAME) Melinda Mei

COMPANY NAME: Dept of Water + Sanitation

STREET ADDRESS: Louisvale Road

DO NOT DELIVER TO A P.O. BOX NO.

CITY Upington

COUNTRY: S.A.

POST/ZIP CODE: 8801

TELEPHONE NUMBER & E-MAIL: 054 - 338 5836

PIECES	DIMENSIONS		
1		X	X
		X	X
		X	X
		X	X
		X	X
		X	X
		X	X

IMPORT & EXPORT CODE

AL DOCUMENT EXPRESS
AL PARCEL EXPRESS
IALS
REIGHT
S BORDER ROAD FREIGHT

DOMESTIC SERVICES

OVERNIGHT EXPRESS X
IN CITY DELIVERY
BUDGET CARGO 21-48 HRS
ROAD FREIGHT 48-96 HRS

DOMESTIC SERVICES

SAME DAY
DAWN DELIVERY BY 09H00
SATURDAY DELIVERY
AFTER HOURS
PUBLIC HOLIDAY

SPECIAL INSTRUCTIONS

USTOMS VALUE

S YES NO
E YES NO

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE OF GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME: A TAYLOR
SIGNATURE: Taylor
DATE: 18-9-17 TIME:

RECEIVED BY GLOBEFLIGHT WORLDWIDE EXPRESS
PRINT NAME:
SIGNATURE:
DATE: 15/9/17 TIME:

RECEIVED IN GOOD ORDER AND CONDITION
PRINT NAME:
CONSIGNEE SIGNATURE:
DATE: TIME:

DESCRIPTION OF CONTENTS

Documents

serves the right to choose the service "Budget" should no service label be selected

Please note indemnity clause in Terms & Conditions

Follow-up Reminder Email sent to I&APs and Stakeholders on 26 October 2015 during the 30-day review of the Scoping Report and Addendum

From: Kelly Stroebel
To:
BC AbrahamsN@nra.co.za; aditeme@agri.ncape.gov.za; admin@grasslands.org.za; advocacy@birdlife.org.za; annelizac@nda.agric.za; atiplady@ska.ac.za; chris@salt.ac.za; clarkem@kaigarib.gov.za; claude@veroniva.co.za; Clive.Stephenson@transnet.net; CloeteS@dws.gov.za; elsabe.dtec@gmail.com; esibeko@dtps.gov.za; fpr@bodr.gov.za; GeerinJH@eskom.co.za; Gilbert.Nortier@transnet.net; gloria.tlaky@gmail.com; HaarhL@eskom.co.za; HAlberts@environment.gov.za; howard.hendricks@sanparks.org; JacolineMa@daff.gov.za; joh.henschel@saeon.ac.za; karen@mulilo.com; Kgauta.Mokoena@dmr.gov.za; klawrence@trpw.ncape.gov.za; l.ntsolo@sanbi.org.za; LeaskK@eskom.co.za; ltoolsbernado@ncpg.gov.za; Marina.Lourens@transnet.net; MashuduMa@daff.gov.za; Mayvyn.Bhana@transnet.net; MeiM@dwa.gov.za; mitchell.hodgson@scatecsolar.com; mm@kaigarib.gov.za; mmathews@ncpg.gov.za; mndzilili@ncpg.gov.za; monica.lepheane@labour.gov.za; MRabothata@environment.gov.za; ncagric@worldonline.co.za; nhlakad@daff.gov.za; ontvang@agric.co.za; oriba@ncpg.gov.za; peter.buys@nersa.org.za; pietk@karsten.co.za; pruplal@icasa.org.za; ptiger@ncpg.gov.za; raoul@salt.ac.za; ratha.timothy@gmail.com; rredelstorff@sahra.org.za; rwarie@ncpg.gov.za; sb@siyanda.gov.za; SchwartzC@dws.gov.za; sdelafontaine@gmail.com; sharon@nocci.co.za; smbanjwa@ncpg.gov.za; straussdj@stocksandstrauss.com; strohl@caa.co.za; teresascheepers@vodamail.co.za; ThokoB@daff.gov.za; vanwyk88@hotmail.com; waltjc@nra.co.za; wep@ewt.org.za; wlutsch@environment.gov.za; WyngaaJO@eskom.co.za

Date: 17/10/2017 12:36
Subject: REMINDER: juwi Skeerhok PV projects: release of DSR's for public comment
Attachments: CSIR Letter to I&APs_juwi Skeerhok PV projects.pdf

Dear Stakeholder,

Please be reminded that the comment period for the below-mentioned juwi Skeerhok Solar PV 1, 2 and 3 Draft Scoping Reports ends next week **Monday the 23rd October.** Kindly submit all comments to the undersigned by that date.

Please contact me should you require any further information.

Kind Regards,

Kelly Stroebel
Environmental Assessment Practitioner (EAP)
CSIR Stellenbosch

kstroebel@csir.co.za
Tel. : 021 888 2432
PO Box 320, Stellenbosch, 7599

>>> Kelly Stroebel 18/09/2017 11:23 >>>
Dear Stakeholder,

RE: release of Draft scoping reports for the Proposed development of three Solar Photovoltaic (PV) Facilities (referred to as Skeerhok pv 1, Skeerhok pv 2 and Skeerhok pv 3) on PoRTion 9 oF GEMSBOK BULT 120 AND PORTION 0 OF SMUTSHOEK 395, north-east of Kenhardt, Northern Cape Province

Please see attached letter notifying you of the availability of the three above-mentioned Draft Scoping Reports for public comment. In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the three Solar PV facilities. (CSIR) has been appointed by the Project Applicant (juwi Renewable Energies (Pty) Ltd) to undertake the separate required Basic Assessment and Scoping and EIA Processes for the proposed projects.

Hard copies of the Scoping Reports are available for public viewing at the Kenhardt Library (in Park Street). The Draft Scoping Reports can also be downloaded from the following website: https://www.csir.co.za/environmental-impact-assessment

The comment period extends from Wednesday 20th September 2017 to Monday 23rdOctober 2017. Please submit any comments on the DSR's to the CSIR project manager (contact details below) by the 23rd October 2017.

Kindly contact the undersigned for further information or for any queries relating to the above.

Kind Regards,

Kelly Stroebel
Environmental Assessment Practitioner (EAP)
CSIR Stellenbosch

kstroebel@csir.co.za
Tel. : 021 888 2432
PO Box 320, Stellenbosch, 7599

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX F:

Copy of Site Notice Boards and Proof of Placement

CONTENTS

Site Notice Board – English

JOINT NOTICE OF BASIC ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC FACILITIES AND ASSOCIATED ELECTRICAL INFRASTRUCTURE, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

Notice is given in terms of Environmental Impact Assessment (EIA) Regulations under, sub-regulation 41 (2) (a), published in Government Gazette 40772 of 7 April 2017, of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA), that juwi Renewable Energies (Pty) Ltd (herein after referred to as "juwi") proposes to construct and operate 3 x 100 Megawatt (MW) Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (subject to a separate Basic Assessment Process) near Kenhardt in the Northern Cape Province. The proposed Facilities will be constructed on two land portions, namely Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120, located approximately 43 km north-east of Kenhardt. The proposed Solar Facilities will be connected to the Nieuwehoop Substation via 132 kV transmission lines for each 100 MW Facility.

A full Scoping and EIA Process is required for the construction of the three Solar PV Facilities. A separate Basic Assessment Process is also required and will be undertaken for the development of the proposed transmission lines. The CSIR has been appointed by juwi to undertake the required Basic Assessment and Scoping and EIA Processes for the proposed projects. The need for a Basic Assessment and Scoping and EIA is triggered by the following potential listed activities listed in GNR 324,325 and 327:

Government Notice	Listed Activity Number
GNR 327, 7 April 2017	Activity 11; Activity12 (x) and (xii); Activity 19 (i); Activity 24 (ii) and Activity 28 (ii)
GNR 325, 7 April 2017	Activity 1; Activity 14 and Activity 15
GNR 324, 7 April 2017	Activity 18

Since the proposed 100 MW Solar PV Facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) will be lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Solar PV Facility and transmission line. Separate reports (i.e. Basic Assessment and Scoping and EIA Reports) will be compiled for each project.

To ensure that you are included on the project register as an Interested and Affected Party (I&AP), as well as to raise any issues and concerns for inclusion in the Scoping/EIA Reports, you are kindly requested to register your interest in the projects and submit any comments you may have to the CSIR (at the details indicated below).

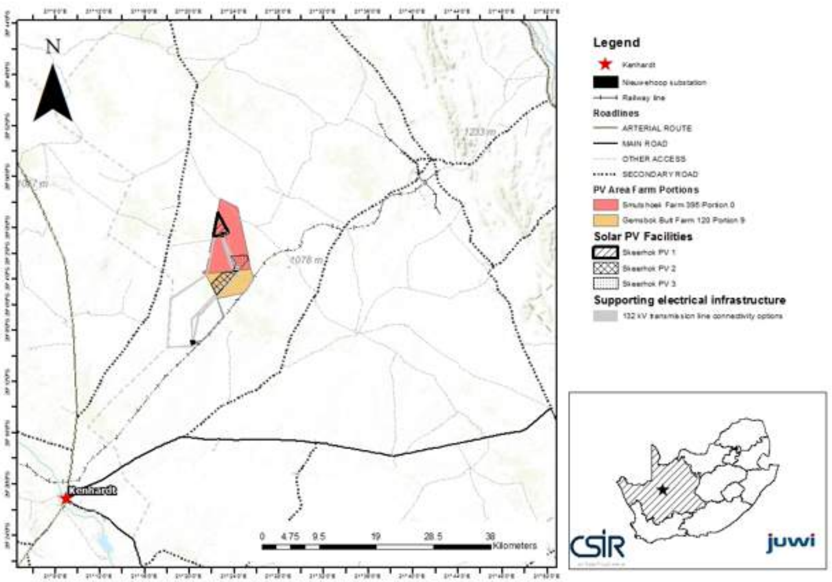


Figure: Locality Map depicting the location of the proposed three Solar Photovoltaic Facilities

Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstrobel@csir.co.za

Site **Notice**

Board - Afrikaans

GEKOMBINEERDE KENNISGEWING VAN OMGEWINGSIMPAKSTUDIE (OIS) EN BASIESE BESTEKOPNAME PROSESSE

GEINTEGREERDE PUBLIEKE DEELNAME PROSES VIR DIE VOORGESTELDE DRIE FOTOVOLTAÏSE SONKRAGAANLEGTE VAN 100 MW ELK EN MEEGAANDE ELEKTRIESE INFRASTRUKTUUR VIR JUWI NABY KENHARDT IN DIE NOORD-KAAP PROVINSIE

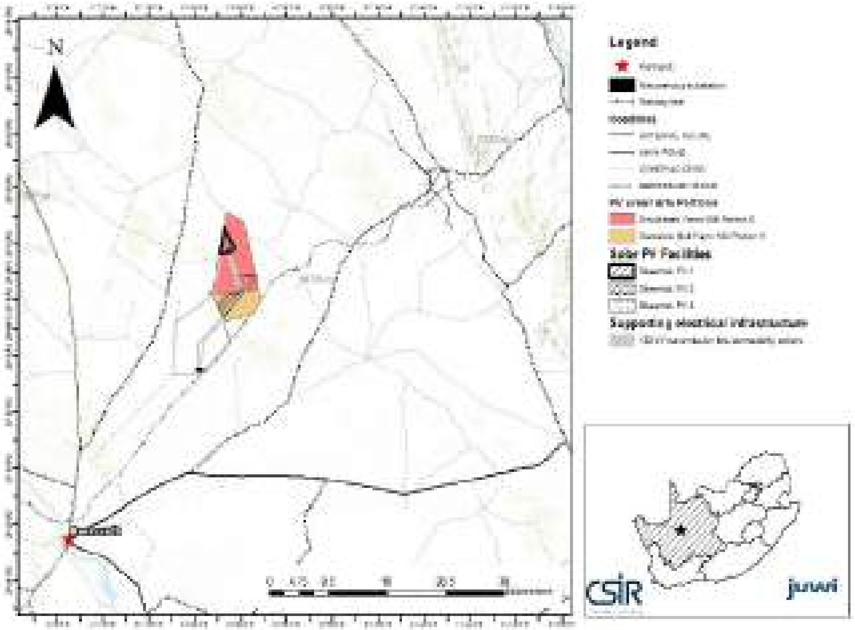
Hiermee word kennis gegee in terme van Regulasie 41 (2) van die Omgewingsimpakstudie (OIS) Regulasies soos gepubliseer in Staatskoerant No 40772 op 7 April 2017, van die Nasionale Omgewingsbeheer Wet, 1998 (Wet No 107 van 1998) (NEMA), dat juwi Renewable Energies' (Pty) Ltd (hierna verwys as "juwi") van voorneme is om drie fotovoltaïse sonkragaanlegte van 100 MW elk en drie geassosieerde kraglyne te installer en te bedryf naby Kenhardt in die Noord Kaap. Die kraglyne sal deel uitmaak en geassesseer word in drie aparte Basiese Evalueringsprosesse wat later onderneem sal word. Die voorgestelde fotovoltaïse sonkragaanlegte sal aansluit by die Nieuwehoop Substasie via drie 132 kV kraglyne (een vir elke fotovoltaïse sonkragaanleg. Die voorgestelde fotovoltaïse sonkragaanlegte sal opgerig word op die volgende plase: Gedeeltes 0 van Smutshoek Plaas 395 en Gedeelte 9 van Gemsbok Bult Plaas 120, geleë ongeveer 43 km noord oos van Kenhardt.

Die beoogde drie fotovoltaïse sonkragaanlegte vereis dat 'n Omvangsbepaling en Omgewingsevaluering (OIE) proses onderneem moet word. Die drie kraglyne vereis dat 'n Basiese Evalueringsproses onderneem word. Die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) is deur juwi aangestel om die vereiste prosesse te onderneem. Die prosesse word benodig omdat die volgende aktiwiteite soos gelys in Staatskennisgewings R 324, R 325 en R 327 van toepassing is:

Staatskennisgewing	Gelyste aktiwiteite
GNR 327, 7 April 2017	Aktiwiteite 11; 12 (x) en (xii); 19 (i); 24 (ii) en 28 (ii)
GNR 325, 7 April 2017	Aktiwiteite 1; 14 & 15
GNR 324, 7 April 2017	Aktiwiteit 18

Aangesien al drie son plaas projekte in dieselfde geografiese area geleë is en dieselfde tipe aktiwiteit behels sal 'n geïntegreerde Publieke Deelname Proses onderneem word. Drie aparte aansoeke en OIE verslae sal ingedien word vir evaluering deur die Nasionale Departement van Omgewingsake vir die fotovoltaïse sonkragaanlegte. Drie aparte aansoeke sal ook ingedien word vir die geassosieerde kraglyne en dit sal onderhewig wees aan drie aparte Basiese Bestekopname prosesse waarvoor drie aparte verslae opgestel gaan word.

Om te verseker dat u vir die projekte as 'n Belangstellende en Geaffekteerde Party (B&GP) geregistreer word of om enige kwessie uit te lig aangaande die projekte, word u vriendelik versoek om te registreer vir die projek en u kommentaar aan WNNR se projek bestuurder (inligting hieronder) te stuur.



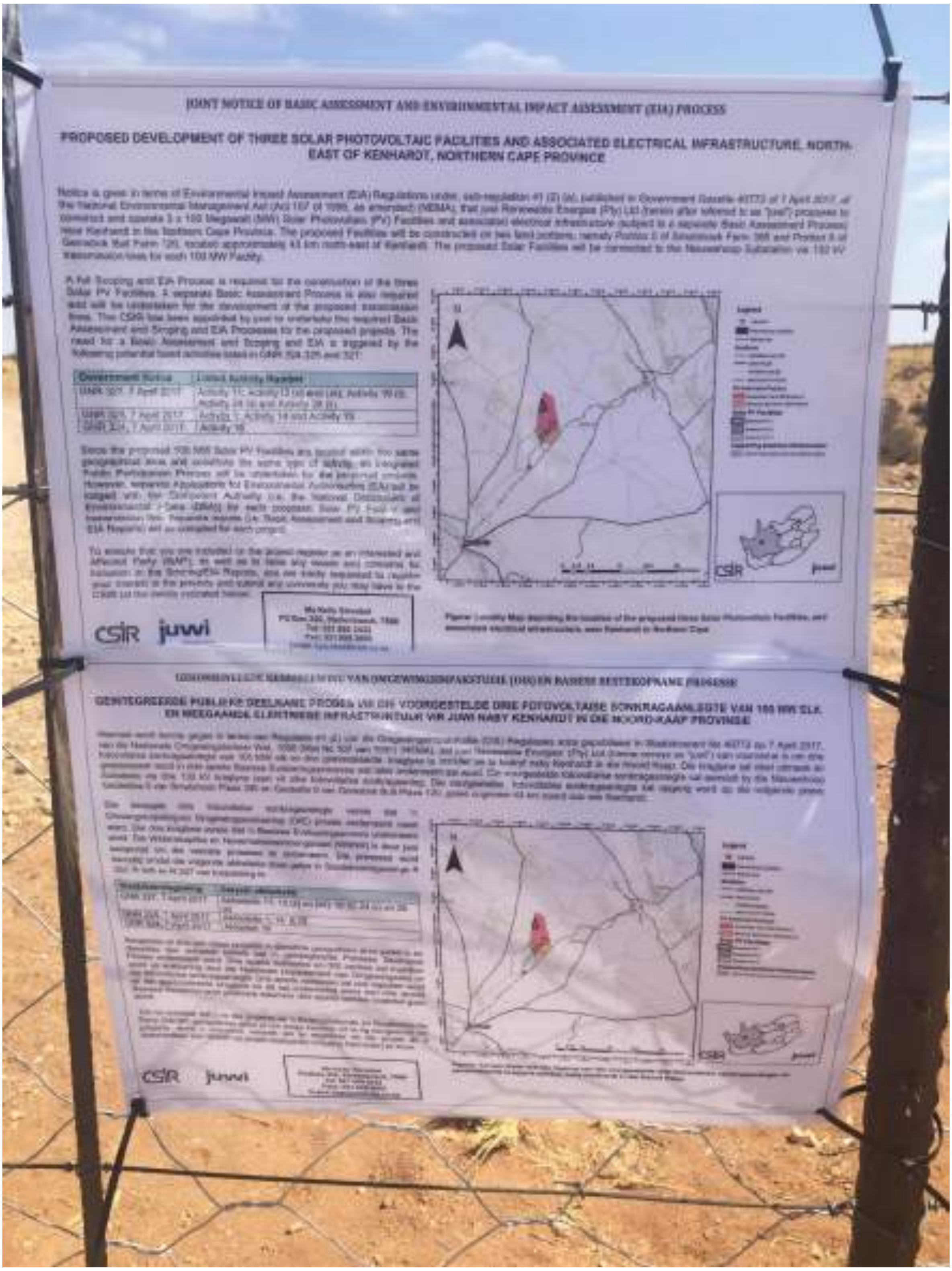
Figuur: Terrein Kaart wat die ligging van die voorgestelde drie fotovoltaïse sonkragaanlegte en geassosieerde kraglyne aandui, naby Kenhardt in die Noord Kaap.

CSIR juwi

Ms Kelly Stroebel
Posbus 320, Stellenbosch, 7599
Tel: 021 888 2432
Faks: 021 888 2693
E-pos: kstroebel@csir.co.za

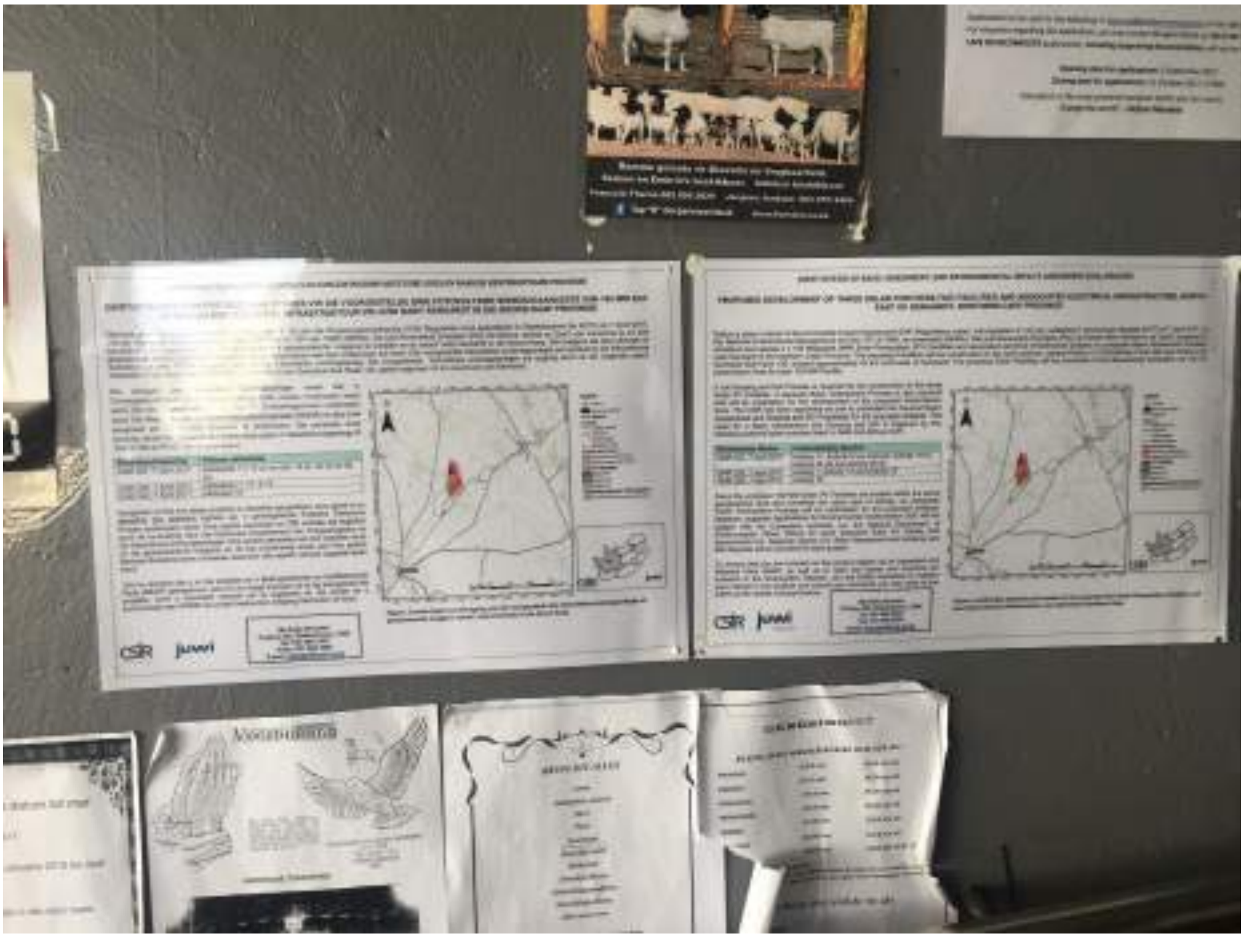
Proof of Placement of Site Notice Boards: 19th September 2017

Site Notice Board (English and Afrikaans) placed at the entrance to the site, which serves as one of the access routes. GPS Co-ordinates of the site notice: 29º4'3"S; 21º25'35"E

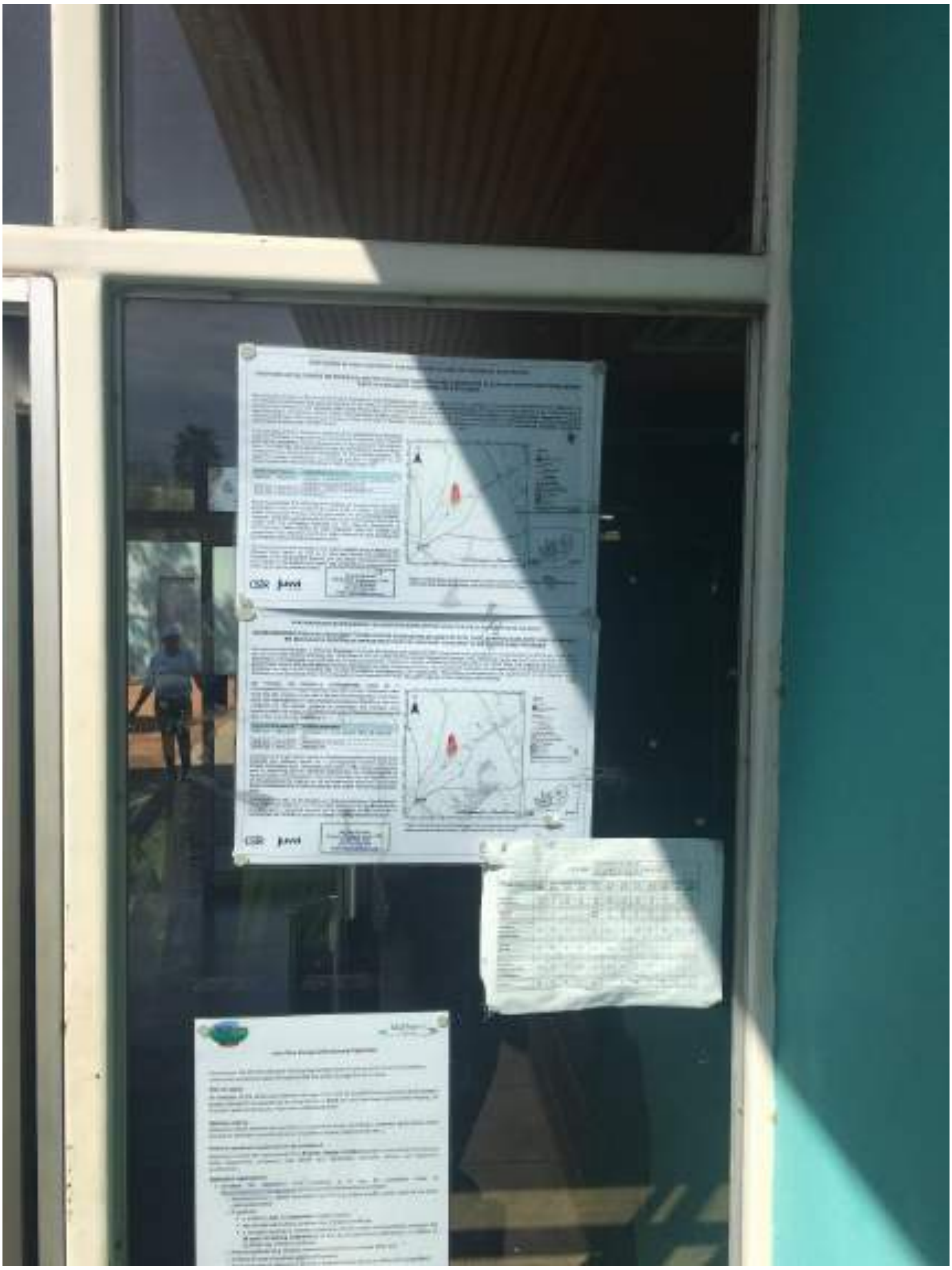


Site Notice Board (English and Afrikaans) placed at the entrance to the site, which serves as one of the access routes. GPS Co-ordinates of the site notice: 29º4'3"S; 21º25'35"E

Additional Locations of the site notices placed on 19th September 2017



Site Notice Board (English and Afrikaans) placed at the Kenhardt Petrol Station.



Close up image of the Site Notice Board (English and Afrikaans) placed at the Kai !Garib Municipality Offices in Kenhardt.

Site Notice Board (English and Afrikaans) placed at the entrance to the Transnet road (alongside the railway line), which serves as one of the access routes to the project sites.

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX G:

Communication from I&APs

From: Elsabe Swart <elsabe.dtec@gmail.com>
To: <kstroebel@csir.co.za>
CC: Conrad Geldenhuys <c.geldenhuys@hotmail.com>, Louise Geldenhuys <geldenhuys.louise1@gmail.com>, Marnus Smit <zmsmit.denc@gmail.com>, Natalie Uys <nuys.denc@gmail.com>, Peter Cloete <peter.denc87@gmail.com>, Peter Ramollo <ramollopp@gmail.com>, Samantha De la Fontaine <sdelafontaine@gmail.com>
Date: 20/09/2017 12:13
Subject: Fwd: juwi Skeerhok PV projects; release of DSR's for public comment
Attachments: CSIR Letter to I&APs_juwi Skeerhok PV projects.pdf

Dear Kelly

Due to short notice, there is not enough time to go through the documentation.

However, I would like to highlight some aspects that must be considered and responded to:

1. Should any impact occur within a CBA area (2017 version) within the Northern Cape, it will trigger a biodiversity offset. Accordingly, a biodiversity status assessment report must be prepared as well for consideration.
2. Confirmation must be obtained from SKA that the development planned will not negatively effect SKA activities or plans, nor will it be within their declared spatial area declared in Government Gazette.

Thank you

From: Claude Bosman <claude@veroniva.co.za>
To: Kelly Stroebel <KStroebel@csir.co.za>
CC: Surina Laurie <SLaurie@csir.co.za>
Date: 21/09/2017 10:19
Subject: Re: juwi Skeerhok PV projects; release of DSR's for public comment

[The e-mail server of the sender could not be verified (SPF Record)]

Hi Kelly,

Can you please send me the KMZ links for the 3x proposed project sites and power corridor to the sub station ?

Thanks
Claude

Claude Bosman (CA) SA
Veroniva (Pty) Ltd - Energy | Property
Tel +27 (0)82 331 4098
www.veroniva.co.za

From: Lizelle Stroh <StrohL@caa.co.za>
To: Kelly Stroebel <KStroebel@csir.co.za>
Date: 21/09/2017 13:19
Subject: RE: juwi Skeerhok PV projects; release of DSR's for public comment
Attachments: Solar Park footprint corners.xls; Pylon Geographic co ordinates.xls

Your enquiry regarding approval from the SACAA with regard to PV farms refers.
There is a SACAA process whereby permission is applied for wrt obstacles which could pose an aviation hazard. More information can be obtained at http://www.caa.co.za. Click on information for industry 'Obstacles' on the LHS. Forms, Part 139-27 and submit on the form itself.

· Kindly provide a .kml (Google Earth) file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid.

· Also indicate the highest structure of the project & the Overhead electric power transmission line.

· Note that there may be other wind farms and PV farms in the area. Unique names are preferable.

· Please always use the proposed PV farm name in the Subject box when corresponding via email with this office and indicate the name & address which should appear on the CAA approval/decline letter.

· There is an assessment fee of R820 per application.
· For billing purposes: company name VAT nr. and postal details.
· Kindly ensure that all the above data is forwarded. Incomplete data causes unnecessary delays.

Kind regards

Lizell Stroh
Obstacle Inspector
PANS-OPS (Procedures for Air Navigation Services-Aircraft Operations)
Air Navigation Services
Tel: 011 545 1232 | Fax: 011 545 1451 | Email: strohl@caa.co.za<mailto:strohl@caa.co.za> | www.caa.co.za

From: "Marina Lourens Transnet Freight Rail" <Marina.Lourens@transnet.net>
To: Kelly Stroebel <KStroebel@csir.co.za>
Date: 22/09/2017 08:38
Subject: FW: juwi Skeerhok PV projects; release of DSR's for public comment
Attachments: Scoping Locality Map_PV AREA 1 (new corridor).tif

[The e-mail server of the sender could not be verified (SPF Record)]

Hi Kelly

Please see mail below from Johannes Hanekom

Thanks

From: Johannes Hanekom *Transnet Property CPT
Sent: 21 September 2017 10:48 AM
To: Marina Lourens Transnet Freight Rail <Marina.Lourens@transnet.net>
Cc: Burton Siljeur *Transnet Property CPT <Burton.Siljeur@transnet.net>
Subject: FW: juwi Skeerhok PV projects; release of DSR's for public comment

Hi Marina

It seems that the Sishen - Saldanha Iron Ore line (between Kenhardt – Rugseer) will not be directly affected by this proposal.

This office in principle has no objection to the proposed application.

With thanks.

Regards

[Jaco Hanekom]

From: John Geeringh <GeerinJH@eskom.co.za>
To: Kelly Stroebel <KStroebel@csir.co.za>
Date: 28/09/2017 13:20
Subject: RE: juwi Skeerhok PV projects; release of DSR's for public comment
Attachments: Eskom requirements for work in or near Eskom servitudes SOLAR (3).doc; Renewable Energy Generation Plant Setbacks to Eskom Infrastructure - Signed.pdf

[The e-mail server of the sender could not be verified (SPF Record)]

Please find attached Eskom requirements for works at or near Eskom infrastructure. Please send me KMZ files of the development and proposed grid connection when available.

Regards

John Geeringh (Pr Sci Nat)
Senior Consultant Environmental Management
Eskom: GC Land Development
D1 Y39
Megawatt Park
P O Box 1091
Johannesburg
2000

Tel: 011 516 7233
Fax: 086 661 4064
Cell: 083 632 7663
E-mail: john.geeringh@eskom.co.za

Eskom requirements for work in or near Eskom servitudes.

1. Eskom's rights and services must be acknowledged and respected at all times.

2. Eskom shall at all times retain unobstructed access to and egress from its servitudes.

3. Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.

4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.

5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.

6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.

8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees.

The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.

9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager

   Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.

11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.

12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by *Regulation 15* of the *Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).*

13. Equipment shall be regarded electrically live and therefore dangerous at all times.

14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.

15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.

16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.

17. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

John Geeringh (Pr Sci Nat)
Senior Consultant Environmental Management

Eskom GC: Land Development

Eskom	SCOT	Technology

Title:	**Renewable Energy Generation Plant Setbacks to Eskom Infrastructure**	Unique Identifier:	**240-65559775**
		Alternative Reference Number:	**N/A**
		Area of Applicability:	**Power Line Engineering**
		Documentation Type:	**Guideline**
		Revision:	**0**
		Total Pages:	**8**
		Next Review Date:	**N/A**
		Disclosure Classification:	**CONTROLLED DISCLOSURE**

Compiled by	Approved by	Authorised by
J W Chetty	**V Naidoo**	**R A Vajeth**
Mechanical Engineer	**Chief Engineer (Lines)**	**Acting Snr Manager (Lines)**
Date: 20/02/2014	Date: 24/02/2014	Date: 27/2/2014

Supported by SCOT/SC

R Vajeth

SCOT/SC/ Chairperson

Date: 27/2/2014

PCM Reference: 240-65132732 **LINE ENGINEERING SERVICES**
SCOT Study Committee Number/Name : **OVERHEAD LINES**

CONTENTS

FIGURES

EXECUTIVE SUMMARY

In recent decades, the use of wind turbines, concentrated solar plants and photovoltaic plants have been on the increase as it serves as an abundant source of energy. This document specifies setbacks for wind turbines and the reasons for these setbacks from infrastructure as well as setbacks for concentrated solar plants and photovoltaic plants. Setbacks for wind turbines employed in other countries were compared and a general setback to be used by Eskom was suggested for use with wind turbines and other renewable energy generation plants.

1. INTRODUCTION

During the last few decades, a large amount of wind turbines have been installed in wind farms to accommodate for the large demand of energy and depleting fossil fuels. Wind is one of the most abundant sources of renewable energy. Wind turbines harness the energy of this renewable resource for integration in electricity networks. The extraction of wind energy is its primary function and thus the aerodynamics of the wind turbine is important. There are many different types of wind turbines which will all exhibit different wind flow characteristics. The most common wind turbine used commercially is the Horizontal Axis Wind Turbine. Wind flow characteristics of this turbine are important to analyse as it may have an effect on surrounding infrastructure.

Wind turbines also cause large turbulence downwind that may affect existing infrastructure. Debris or parts of the turbine blade, in the case of a failure, may be tossed behind the turbine and may lead to damage of infrastructure in the wake path.

This document outlines the minimum distances that need to be introduced between a wind turbine and Eskom infrastructure to ensure that debris and / or turbulence would not negatively impact on the infrastructure.

Safety distances of wind turbines from other structures as implemented by other countries were also considered and the reasons for their selection were noted.

Concentrated solar plants and photovoltaic plants setbacks away from substations were also to be considered to prevent restricting possible power line access routes to the substation.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document provides guidance on the safe distance that a wind turbine should be located from any Eskom power line or substation. The document specifies setback distances for transmission lines (220 kV to 765 kV), distribution lines (6.6 kV to 132 kV) and all Eskom substations. Setbacks for concentrated solar plants and photovoltaic plants are also specified away from substations.

2.1.1 Purpose

Setbacks for wind turbines and power lines / substations are required for various reasons. These include possible catastrophic failure of the turbine blade that may release fragments and which may be thrown onto nearby power lines that may result in damage with associated unplanned outages. Turbulence behind the turbine may affect helicopter flight during routine Eskom live line maintenance and inspections that may lead to safety risk of the aircraft / personnel. Concentrated solar plants and photovoltaic plants setback away from substations were required to prevent substations from being boxed in by these renewable generation plants limiting line route access to the substations.

2.1.2 Applicability

This document is applicable to the siting of all new and existing wind turbines, concentrated solar plants and photovoltaic plants near power lines and substations.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

1. http://www.envir.ee/orb.aw/class=file/action=preview/id=1170403/Hiiumaa+turbulence+impact+EMD.pdf.
2. http://www.energy.ca.gov/2005publications/CEC-500-2005-184/CEC-500-2005-184.PDF
3. http://www.adamscountywind.com/Revised%20Site/Windmills/Adams%20County%20Ordinance/Adams%20County%20Wind%20Ord.htm
4. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=PA11R&RE=1&EE=1
5. http://www.wind-watch.org/documents/european-setbacks-minimum-distance-between-wind-turbines-and-habitations/
6. http://www.publications.parliament.uk/pa/ld201011/ldbills/017/11017.1-i.html
7. http://www.caw.ca/assets/pdf/Turbine_Safety_Report.pdf
8. Rogers J, Slegers N, Costello M. (2011) A method for defining wind turbine setback standards. Wind energy 10.1002/we.468

2.2.2 Informative

None

2.3 DEFINITIONS

Definition	Description
Setback	The minimum distance between a wind turbine and boundary line/dwelling/road/infrastructure/servitude etc.
Flicker	Effect caused when rotating wind turbine blades periodically cast shadows
Tip Height	The total height of the wind turbine ie. Hub height plus half rotor diameter (see Figure1)

2.3.1 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
None	

2.5 ROLES AND RESPONSIBILITIES

All personnel involved in the positioning wind turbines, concentrated solar plants and photovoltaic plants near power lines/substations must follow the setbacks outlined in this guideline.

2.6 PROCESS FOR MONITORING

Approval by Eskom in writing.

2.7 RELATED/SUPPORTING DOCUMENTS

None

3. DOCUMENT CONTENT

3.1 INTERNATIONAL SETBACK COMPARISON

Wind Turbine setbacks employed by various countries were considered. It was found that setbacks were determined for various reasons that include noise, flicker, turbine blade failure and wind effects. The distances (setbacks) varied based on these factors and were influenced by the type of infrastructure

Wind turbine setbacks varied for roads, power lines, dwellings, buildings and property and it was noted that the largest setbacks were employed for reasons of noise and flicker related issues [1-7]. Very few countries specified setbacks for power lines.

The literature survey [1-7], yielded information about studies and experiments were conducted to determine the distance that a broken fragment from a wind turbine might be thrown. Even though of low probability of hitting a power line [5.0×10^{-5} [8]], the distances recorded were significant [750m [8]]

Setbacks were thus introduced to prevent any damage to Eskom infrastructure.

Wind turbines may also cause changes in wind patterns with turbulent effects behind the hub. These actors dictate the wind turbine setbacks specified in this document.

Concentrated solar plants and photovoltaic plants also can limit access into the substation for power lines of all voltages. A setback distance must therefore be employed to prevent the substation from being boxed in by these generation plants. These setback distances are specified in this document.

3.2 ESKOM REQUIRED SETBACKS

- Eskom requires a setback distance of 3 times the tip height of the wind turbine from the edge of the closest Eskom servitude (including vacant servitudes) for transmission lines.
- Eskom requires a setback distance of 1 times the tip height of the wind turbine from the edge of the closest Eskom servitude (including vacant servitudes) for distribution Lines.
- Eskom must be informed of any proposed wind turbine, concentrated solar plants and photovoltaic activity within a 5 km radius of a substation. No wind turbine structure shall be built within a 2 km radius of the closest point of the substation. Where concentrated solar plants and photovoltaic structures fall within a 2 km radius of the closest point of a substation, Eskom should be informed in writing during the planning phase of the construction of such plant or structure.
- Applicants must show that Eskom radio telecommunication systems (mainly microwave systems) will not be affected in any way by wind turbines.

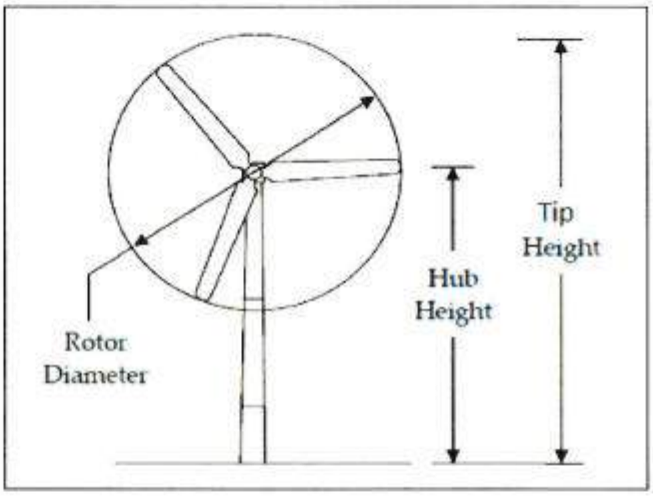


Figure 1: Horizontal Axis Wind Turbine [2]

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
V Naidoo	Chief Engineer
Dr P H Pretorius	Electrical Specialist
J Geeringh	Snr Consultant Environ Mngt
B Haridass	Snr Consultant Engineer
R A Vajeth	Acting Snr Manager (Lines)

5. REVISIONS

Date	Rev.	Compiler	Remarks
November 2013	0	J W Chetty	First Publication - No renewable energy generation plant setback specification in existence

6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

Jonathan W Chetty (Mechanical Engineer)

Vivendhra Naidoo (Chief Engineer)

Dr Pieter H Pretorius (Electrical Specialist)

John Geeringh (Snr Consultant Environ Mngt)

Bharat Haridass (Snr Consultant Engineer)

Riaz A Vajeth (Acting Snr Manager (Lines))

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko Road· PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 14/12/16/3/3/2/1033
Enquiries: Ms Mmamohale Kabasa
Telephone: (012) 399 9420 **E-mail:** MKabasa@environment.gov.za

Ms Kelly Stroebel
Council for Scientific and Industrial Research (CSIR)
PO Box 320
STELLENBOSCH
7599

Telephone Number: (021) 888 2432
Email Address: kstroebel@csir.co.za

PER E-MAIL / MAIL

Dear Ms Stroebel

COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED 100MW SKEERHOK 1 PHOTOVOLTAIC SOLAR ENERGY FACILITY ON PORTION 0 OF THE FARM SMUTSHOEK NO. 395 NORTH-EAST OF THE TOWN OF KENHARDT WITHIN THE !KHEIS LOCAL MUNICIPALITY IN THE NORTHERN CAPE PROVINCE

The draft Scoping Report (SR) dated September 2017 and received by this Department on 19 September 2017 refers.

<u>This Department has the following comments on the abovementioned application:</u>

i. Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.
ii. If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms.
iii. The final SR must provide evidence that all relevant and identified competent authorities have been given an opportunity to comment on the proposed development.
iv. Please ensure that all issues raised and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final SR. Proof of correspondence with the various stakeholders must be included in the final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014, as amended.
v. Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity as per Appendix 2 of the EIA Regulations, 2014, as amended. Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2.

vi. It is noted that the following activities that occur within watercourses have been applied for: G.NR. 983 Activities 12(x) and (xii); and 19(i). A separate hydrological assessment to assess the impacts on the surface hydrology of the proposed development area is required. The hydrological assessment to be conducted must assess, *inter alia* the following:
   - Identification and sensitivity rating of all surface water courses for the impact phase of the proposed development;
   - Identification, assessment of all potential impacts to the water courses and suggestion of mitigation measures; and,
   - Recommendations on the preferred placement of the facility and all associated infrastructure and preference must be provided to the avoidance of the watercourses on the property.

vii. The study area falls within the ambit of the Square Kilometre Array - South Africa. The impacts associated with radio frequency interference on the SKA must form part of the environmental impact assessment. The Department notes that the EAP and applicant have initiated engagements with the SKA-SA on this matter. The Department urges the EAP to ensure that the ToR for the study, should there be one necessary, be included in the final scoping report.

viii. <u>The Department notes that the EAP recommends that full specialist studies not be conducted during the EIA process for impacts associated with: palaeontology, agriculture, social and traffic. The Department requires that a suitably qualified specialist provide an environmental impact statement in this regard. The impact statement must also advise on cumulative impacts as a result of the above-mentioned impacts.</u>

ix. You are hereby advised that the final SR must provide the names of the specialists that will conduct the various studies as outlined in the PoSEIA.

x. The EAP must ensure that the terms of reference for all the identified specialist studies must include the following:
   - A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations.
   - Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.
   - Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads and internal cables is allowed in the 'no-go' areas.
   - Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' areas buffer if applicable.
   - All specialist studies must be final, and provide detailed/practical mitigation measures and recommendations, and must not recommend further studies to be completed post EA.
   - Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land.
   - A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
   - Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology approved with the acceptance of the scoping report.
   - The significance rating must also inform the need and desirability of the proposed development.
   - A cumulative impact environmental statement on whether the proposed development must proceed.

xi. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.

xii. Where specialist studies are conducted in-house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist reports must be peer reviewed by a suitably qualified external specialist in the relevant field. The terms of reference for the peer review must include:
   - A CV clearly showing expertise of the peer reviewer;
   - Acceptability of the terms of reference;

- ➢ Is the methodology clearly explained and acceptable;
- ➢ Evaluate the validity of the findings (review data evidence);
- ➢ Discuss the suitability of the mitigation measures and recommendations;
- ➢ Identify any short comings and mitigation measures to address the short comings;
- ➢ Evaluate the appropriateness of the reference literature;
- ➢ Indicate whether a site-inspection was carried out as part of the peer review; and
- ➢ Indicate whether the article is well-written and easy to understand.

xiii. In terms of Appendix 2 of the EIA Regulations, 2014, as amended, the report must include an undertaking under oath or affirmation by the EAP in relation to:
- the correctness of the information provided in the reports;
- the inclusion of comments and inputs from stakeholders and I&APs;
- the inclusion of inputs and recommendations from the specialist reports where relevant;
- any information provided by the EAP to I&APs; and
- responses by the EAP to comments or inputs made by I&APs.

xiv. The affirmation of oath by the EAP must be witnessed and signed by a commissioner of oath.

xv. In accordance with Appendix 2 of the EIA Regulations 2014, as amended, the details of—
(i) the EAP who prepared the report; and
(ii) the expertise of the EAP to carry out Scoping and Environmental Impact assessment procedures;
must be submitted.

xvi. You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations, 2014, as amended.

Further note that in terms of Regulation 45 of the EIA Regulations 2014, as amended, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of the these Regulations, unless an extension has been granted in terms of Regulation 3(7).

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Signed by: Mr Coenrad Agenbach
Designation: Deputy Director: Strategic Infrastructure Developments
Date: 19/10/2017

cc:	C Forster	Juwi Renewable Energies (Pty) Ltd	Email: cleo.forster@juwi.co.za

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DEA Reference: CSIR Skeerhok PV1
Enquiries: Mr S. Lekota
Telephone: (012) 399 9573

Surina Laurie
CSIR Environmental Management Services
P.O. Box 320
STELLENBOSCH
7599

Telephone: 021 888 2432
Email Address: kstroebel@csir.co.za

Dear Surina

COMMENTS ON THE DRAFT SCOPING REPORT (DSR) FOR THE PROPOSED DEVELOPMENT OF A 100 MW SOLAR PHOTOVOLTAIC FACILITY (SKEERHOK PV 1) ON THE FARM SMUTSHOEK 395, PORTION 0, NORTH EAST OF KENHARDT, NORTHERN CAPE PROVINCE.

1. PURPOSE

To provide you with comments on the above mentioned draft Scoping Report (DSR) for the above mentioned project within the Northern Cape Province

2. BACKGROUND AND COMMENTS ON DRAFT SCOPING REPORT

The directorate: Biodiversity Conservation received and evaluated the DSR for the above mentioned project and based on the information provided, the project will have more terrestrial and aquatic ecological impacts, both during construction and operational phases.

Construction Phase

- The proposed development will cause more disturbance on fauna, refugia and general change in habitat.
- The increased electrical light pollution will lead to changes in nocturnal behavioural patterns amongst faunal activities.
- Alteration in surface drainage patterns on account of construction activities will lead to rapid change in plant communities and general habitat structure both within the site and immediately adjacent to site.
- Alteration of surface water quality on account of construction activities will lead to changes in water chemistry.

Operational Phase

- Increased shading of vegetation as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.
- The fencing of the site, possibly with electric fencing, is likely to impact upon faunal behaviour, leading to the exclusion of certain species and possible mortalities.
- Abstraction of ground water for the cleaning of modules will alter the state of sub-surface water resources.

3. RECOMMENDATIONS

After reviewing and evaluating the potential impacts of the project on flora and faunal species, it is recommended that the following be included in the final Scoping Report (FSR).

- Biodiversity Specialist Impact Assessment is recommended to be included in the FSR in order to validate the predicted impacts and significance of the Skeerhok PV 1, as well as to propose any relevant mitigation measures.
- Aquatic Specialist Impact Assessment must be compiled and submitted during the FSR.
- Mitigation options must be considered in terms of the following hierarchy: (1) avoidance, (2) minimization, (3) restoration and (4) offsets.
- The Critical Biodiversity Areas map must be submitted indicating all efficient selection and classification of land portions requiring protection and maintenance.
- The cumulative impacts of the area must be assessed and included in the final Scoping phase.
- An EMPr with full Operational Plan as well as any additional information that is outstanding as stated in the draft scoping report should be provided.

4. CONCLUSION

The Directorate: Biodiversity Conservation has reviewed the submitted DSR and recommends that the above mentioned recommendations be included on the final scoping phase

Ms Wilma Lutsch
Director: Biodiversity Conservation
Department of Environmental Affairs
Letter Signed by: Stanley Tshitwamulomoni
Designation: Control Biodiversity Office Grade B
Date: 13/10/2017

DEA's acceptance of Scoping Letter (30 November 2017)

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko Road · Arcadia · PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 14/12/16/3/3/2/1033
Enquiries: Mmamohale Kabasa
Telephone: (012) 399 9420 **E-mail:** MKabasa@environment.gov.za

Ms Kelly Stroebel
Council for Scientific and Industrial Research (CSIR)
PO Box 320
STELLENBOSCH
7599

Telephone Number: (021) 888 2432
Email Address: kstroebel@csir.co.za

PER E-MAIL / MAIL

Dear Ms Stroebel

ACCEPTANCE OF THE SCOPING REPORT FOR THE PROPOSED 100MW SKEERHOK 1 PHOTOVOLTAIC SOLAR ENERGY FACILITY ON PORTION 0 OF THE FARM SMUTSHOEK NO. 395 NORTH-EAST OF THE TOWN OF KENHARDT WITHIN THE !KHEIS LOCAL MUNICIPALITY IN THE NORTHERN CAPE PROVINCE

The Scoping Report (SR) and Plan of Study for Environmental Impact Assessment (PoSEIA) dated September 2017 and received by this Department on 03 November 2017 refers.

This Department has evaluated the submitted SR and the PoSEIA dated September 2017 and is satisfied that the documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2014. The SR is hereby accepted by the Department in terms of Regulation 22 (a) of the EIA Regulations, 2014.

You may proceed with the Environmental Impact Assessment process in accordance with the tasks contemplated in the PoSEIA and the requirements of the EIA Regulations, 2014.

All comments and recommendations made by all stakeholders and Interested and Affected Parties (I&APs) in the draft SR and submitted as part of the final SR must be taken into consideration when preparing an Environmental Impact Assessment report (EIAr) in respect of the proposed development. Please ensure that all mitigation measures and recommendations in the specialist studies are addressed and included in the final EIAr and Environmental Management Programme (EMPr).

Please ensure that comments from all relevant stakeholders are submitted to the Department with the final EIAr. This includes but is not limited to the provincial Northern Cape Department of Environment and Nature Conservation, the Department of Agriculture, Forestry and Fisheries (DAFF), Birdlife South Africa, the !Kheis Local Municipality, the ZF Mgcawu District Municipality, the Department of Water and Sanitation (DWS), the South African National Roads Agency Limited (SANRAL), the South African Heritage Resources Agency (SAHRA), the SKA-SA, the Department of Environmental Affairs: Directorate Biodiversity and Conservation Unit and the Department of Environmental Affairs: Protected Areas Unit.

Please ensure that the EIAr and EMPr comply with Appendix 3 and Appendix 4 of Regulation 2014, as amended before submission to the Department. You are also required to address all issues raised by organs of state and I&APs prior to the submission of the EIAr to the Department.

Proof of correspondence with the various stakeholders must be included in the EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.

The EAP must give registered I&APs access to, and an opportunity to comment on the report in writing within 30 days before submitting the final EIAr to the Department.

In addition, the following:

i. The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.
ii. The listed activities represented in the EIAr and the application form must be the same and correct.
iii. Please ensure that all issues raised and comments received during the circulation of the Scoping Report from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity and Protected Areas Sections) in respect of the proposed activity are adequately addressed and included in the final EIAr. Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014, as amended.
iv. A comments and response trail report (C&R) must be submitted with the final EIAr. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this comments letter.
v. The draft EIAr must provide an English translation of the copy of the newspaper advertisement placed in "Die Gemsbok" on 06 October 2017.
vi. The study area falls within the ambit of the Square Kilometre Array - South Africa. The impacts associated with radio frequency interference on the SKA must form part of the environmental impact assessment. The applicant must liaise with SKA-SA for advice on the terms of reference for the EMI and RFI detailed specialist studies and these studies must be completed, and included in the draft EIAr, with comments being obtained on these studies from the SKA-SA.
vii. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.
viii. The following specialist studies have been identified to be conducted as part of the environmental impact assessment reports:
    - Ecological Impact Assessment (including Terrestrial Ecology): Simon Bundy of Sustainable Development Projects (SDP)
    - Avifauna Impact Assessment: Jon Smallie of Wild Skies Ecological Services
    - Visual Impact Assessment: Luanita Snyman-Van der Walt of CSIR
    - Heritage Impact Assessment (Archaeology and Cultural Landscape): Dr. Jayson Orton of ASHA Consulting (Pty) Ltd.
    - Desktop Palaeontological Impact Assessment: Dr. John Almond of Natura Viva cc
ix. Where specialist studies are conducted in-house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist reports must be peer reviewed by a suitably qualified external specialist in the relevant field. Specifically, the Visual Impact Assessment to be conducted by the CSIR must be peer reviewed. The terms of reference for the peer review must include:
    - A CV clearly showing expertise of the peer reviewer;
    - Acceptability of the terms of reference;
    - Is the methodology clearly explained and acceptable;
    - Evaluate the validity of the findings (review data evidence);

- ➢ Discuss the suitability of the mitigation measures and recommendations;
- ➢ Identify any short comings and mitigation measures to address the short comings;
- ➢ Evaluate the appropriateness of the reference literature;
- ➢ Indicate whether a site-inspection was carried out as part of the peer review; and
- ➢ Indicate whether the article is well-written and easy to understand.

x. The specialist input referred to in comment (viii) of the comments on the draft scoping report signed 19 October 2017; must additionally address the following:
- ➢ Indicate whether the recommendation by the EAP that detailed studies are not required is acceptable;
- ➢ Indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable;
- ➢ Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated;
- ➢ Evaluate the appropriateness of the reference literature used;
- ➢ Indicate details and conclusions of the site-inspection if one was carried out as part of the specialist input;
- ➢ Indicate if the studies being referred to covers the preferred site; and
- ➢ Provide an indication on the cumulative impacts of these studies in relation to the proposed development.
- ➢ Must be conducted or input provided on by a suitably qualified specialist in the field.

xi. Due to the number of similar applications in the area, all the specialist assessments must include a cumulative environmental impact assessment for all identified and assessed impacts. The cumulative impact assessment must indicate the following:
- ➢ Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land.
- ➢ Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
- ➢ The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
- ➢ A cumulative impact environmental statement on whether the proposed development must proceed.

xii. The cumulative impacts on SKA must also be assessed for and considered in the EIAr.

xiii. All communications and correspondences between the EAP and SKA-SA must be included in the EIAr.

xiv. The impacts on the proposed battery storage facility must be adequately assessed. Furthermore, it is noted that the activity applied for the battery storage has a threshold of between 80m³ to 500m³, whereas, the proposed battery storage facility will have a capacity of 1120m³. As such, the correct listed activity must be applied for and all the impacts related to the battery storage facility, including specialist studies if any must be conducted and assessed.

xv. The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under point 2 of the EIA information required for solar energy facilities below.

xvi. The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.

xvii. The EIAr must provide the following:
- Clear indication of the envisioned area for the proposed solar energy facility; i.e. placing of photovoltaic panels and all associated infrastructure should be mapped at an appropriate scale.
- Clear description of all associated infrastructure. This description must include, but is not limited to the following:
    - ➢ Power lines;
    - ➢ Internal roads infrastructure; and;

- All supporting onsite infrastructure such as laydown area, guard house and control room etc.
- All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation.

xviii. The EIAr must include the detail inclusive of the PPP in accordance with Regulation 41 of the EIA Regulations.

xix. Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided.

xx. The EIAr must provide a detailed description of the need and desirability, not only providing motivation on the need for clean energy in South Africa of the proposed activity. The need and desirability must also indicate if the proposed development is needed in the region and if the current proposed location is desirable for the proposed activity compared to other sites.

xxi. A copy of the final site layout map and alternatives. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following:

- PV positions and its associated infrastructure;
- Permanent laydown area footprint;
- Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible);
- Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used;
- The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure;
- Substation(s) and/or transformer(s) sites including their entire footprint;
- Connection routes (including pylon positions) to the distribution/transmission network;
- All existing infrastructure on the site, especially roads;
- Buffer areas;
- Buildings, including accommodation; and
- All "no-go" areas.

xxii. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.

xxiii. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.

xxiv. A shapefile of the preferred development layout/footprint must be submitted to this Department. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:

Postal Address:
Department of Environmental Affairs
Private Bag X447
Pretoria, 0001

Physical address:
Environment House
473 Steve Biko Road
Pretoria

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For Attention: Muhammad Essop
Integrated Environmental Authorisations
Strategic Infrastructure Developments
Telephone Number: (012) 399 9406
Email Address: MEssop@environment.gov.za

The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following:

i. All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted.
ii. The final site layout map.
iii. Measures as dictated by the final site layout map and micro-siting.
iv. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
v. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.
vi. An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.
vii. A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.
viii. A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
ix. An open space management plan to be implemented during the construction and operation of the facility.
x. A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
xi. A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment.
xii. A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.
xiii. A fire management plan to be implemented during the construction and operation of the facility.
xiv. An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.
xv. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.
xvi. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.

The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr.

The EAP must provide the final detailed Site Layout Plan as well as the final EMPr for approval with the final EIAr as this Department needs to make a decision on the EA, EMPr and Layout Plan.

Please ensure that all the relevant Listing Notice activities are applied for, that the Listing Notice activities applied for are specific and that they can be linked to the development activity or infrastructure in the project description.

You are hereby reminded that should the EIAr fail to comply with the requirements of this acceptance letter, as well as the requirements of the EIA Regulations, 2017, the project will be **refused** in accordance with Regulation 24(1)(b) of the EIA Regulations, 2014.

The applicant is hereby reminded to comply with the requirements of Regulation 45 with regard to the time period allowed for complying with the requirements of the Regulations, and Regulations 43 and 44 with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making. The reports referred to are listed in Regulation 43(1).

Furthermore, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter II, Section 38 of the National Heritage Resources Act, Act 25 of 1999, then this Department will not be able to make nor issue a decision in terms of your application for Environmental Authorisation pending a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described in Chapter II, Section 38(8) of the National Heritage Resources Act, Act 25 of 1999. Comments from SAHRA and/or the provincial department of heritage must be provided in the EIAr.

You are requested to submit two (2) electronic copies (DVD and USB) and one (1) hard copies of the EIAr to the Department.

Please also find attached information that must be used in the preparation of the EIAr. This will enable the Department to speedily review the EIAr and make a decision on the application.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, which stipulates that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter Signed by: Coenrad Agenbach
Designation: Deputy Director: Strategic Infrastructure Developments
Date: 30|11|2017

cc:	C Forster	Juwi Renewable Energies (Pty) Ltd	Email: cleo.forster@juwi.co.za
	O Riba	Northern Cape DENC	Email: ORiba@ncpg.gov.za/ oriba.denc@gmail.com
	J Essau	!Kheis Local Municipality	Email: Jenkins.esau@gmail.com

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Annexure 1

Format for Comments and Response Trail Report:

Date of comment, format of comment name of organisation/I&AP,	Comment	Response from EAP/Applicant/Specialist
27/01/2016 Email Department of Environmental Affairs: Strategic Infrastructure Development (John Soap)	Please record C&R trail report in this format Please update the contact details of the provincial environmental authority	EAP: ~~(Noted)~~The C&R trail report has been updated into the desired format, see Appendix K EAP: Details of provincial authority have been updated, see page 16 of the Application form

A. EIA INFORMATION REQUIRED FOR SOLAR ENERGY FACILITIES

1. General site information

The following general site information is required:

- Descriptions of all affected farm portions
- 21 digit Surveyor General codes of all affected farm portions
- Copies of deeds of all affected farm portions
- Photos of areas that give a visual perspective of all parts of the site
- Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)
- Solar plant design specifications including:
  - Type of technology
  - Structure height
  - Surface area to be covered (including associated infrastructure such as roads)
  - Structure orientation
  - Laydown area dimensions (construction period and thereafter)
  - Generation capacity
- Generation capacity of the facility as a whole at delivery points

This information must be indicated on the first page of the EIAr. It is also advised that it be double checked as there are too many mistakes in the applications that have been received that take too much time from authorities to correct.

2. Sample of technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	
Area of PV Array	
Number of inverters required	
Area occupied by inverter / transformer stations / substations	
Capacity of on-site substation	
Area occupied by both permanent and construction laydown areas	
Area occupied by buildings	

Length of internal roads	
Width of internal roads	
Proximity to grid connection	
Height of fencing	
Type of fencing	

3. Site maps and GIS information

Site maps and GIS information should include at least the following:

- All maps/information layers must also be provided in ESRI Shapefile format
- All affected farm portions must be indicated
- The exact site of the application must be indicated (the areas that will be occupied by the application)
- A status quo map/layer must be provided that includes the following:
  - ➢ Current use of land on the site including:
    - ▪ Buildings and other structures
    - ▪ Agricultural fields
    - ▪ Grazing areas
    - ▪ Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas
    - ▪ Critically endangered and endangered vegetation areas that occur on the site
    - ▪ Bare areas which may be susceptible to soil erosion
    - ▪ Cultural historical sites and elements
  - ➢ Rivers, streams and water courses
  - ➢ Ridgelines and 20m continuous contours with height references in the GIS database
  - ➢ Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs
  - ➢ High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries
  - ➢ Buffer zones (also where it is dictated by elements outside the site):
    - ▪ 500m from any irrigated agricultural land
    - ▪ 1km from residential areas
  - ➢ Indicate isolated residential, tourism facilities on or within 1km of the site
- A slope analysis map/layer that include the following slope ranges:
  - ➢ Less than 8% slope (preferred areas for PV and infrastructure)
  - ➢ between 8% and 12% slope (potentially sensitive to PV and infrastructure)
  - ➢ between 12%and 14% slope (highly sensitive to PV and infrastructure)
  - ➢ steeper than 18 % slope (unsuitable for PV and infrastructure)
- A site development proposal map(s)/layer(s) that indicate:
  - ➢ Foundation footprint
  - ➢ Permanent laydown area footprint
  - ➢ Construction period laydown footprint
  - ➢ Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible)
  - ➢ River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used
  - ➢ Substation(s) and/or transformer(s) sites including their entire footprint.
  - ➢ Cable routes and trench dimensions (where they are not along internal roads)
  - ➢ Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM)

- Cut and fill areas at PV sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill
- Borrow pits
- Spoil heaps (temporary for topsoil and subsoil and permanently for excess material)
- Buildings including accommodation

With the above information authorities will be able to assess the strategic and site impacts of the application.

4. Regional map and GIS information

The regional map and GIS information should include at least the following:

- All maps/information layers must also be provided in ESRI Shapefile format
- The map/layer must cover an area of 20km around the site
- Indicate the following:
  - roads including their types (tarred or gravel) and category (national, provincial, local or private)
  - Railway lines and stations
  - Industrial areas
  - Harbours and airports
  - Electricity transmission and distribution lines and substations
  - Pipelines
  - Waters sources to be utilised during the construction and operational phases
  - A visibility assessment of the areas from where the facility will be visible
  - Critical Biodiversity Areas and Ecological Support Areas
  - Critically Endangered and Endangered vegetation areas
  - Agricultural fields
  - Irrigated areas
  - An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams

5. Important stakeholders

Amongst other important stakeholders, comments from the National Department of Agriculture, Forestry and Fisheries must be obtained and submitted to the Department. Any application, documentation, notification etc. should be forwarded to the following officials:

Ms Mashudu Marubini
Delegate of the Minister (Act 70 of 1970)
E-mail: MashuduMa@daff.gov.za
Tel 012- 319 7619

Ms Thoko Buthelezi
AgriLand Liaison office
E-mail: ThokoB@daff.gov.za
Tel 012- 319 7634

All hardcopy applications / documentation should be forwarded to the following address:

<u>Physical address:</u>
Delpen Building
Cnr Annie Botha and Union Street
Office 270

Attention: Delegate of the Minister Act 70 of 1970

Postal Address:
Department of Agriculture, Forestry and Fisheries
Private Bag X120
Pretoria
0001
Attention: Delegate of the Minister Act 70 of 1970

In addition, comments must be requested from Eskom regarding grid connectivity and capacity. Request for comment must be submitted to:

Mr John Geeringh
Eskom Transmission
Megawatt Park D1Y38
PO Box 1091
JOHANNESBURG
2000

Tel: 011 516 7233
Fax: 086 661 4064
John.geeringh@eskom.co.za

B. AGRICULTURE STUDY REQUIREMENTS

- Detailed soil assessment of the site in question, incorporating a radius of 50 m surrounding the site, on a scale of 1:10 000 or finer. The soil assessment should include the following:
  - Identification of the soil forms present on site
  - The size of the area where a particular soil form is found
  - GPS readings of soil survey points
  - The depth of the soil at each survey point
  - Soil colour
  - Limiting factors
  - Clay content
  - Slope of the site
  - A detailed map indicating the locality of the soil forms within the specified area,
  - Size of the site
- Exact locality of the site
- Current activities on the site, developments, buildings
- Surrounding developments / land uses and activities in a radius of 500 m of the site
- Access routes and the condition thereof
- Current status of the land (including erosion, vegetation and a degradation assessment)
- Possible land use options for the site
- Water availability, source and quality (if available)
- Detailed descriptions of why agriculture should or should not be the land use of choice
- Impact of the change of land use on the surrounding area
- A shape file containing the soil forms and relevant attribute data as depicted on the map.

C. ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007 (ACT NO. 21 OF 2007)

The purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province excluding the Sol Plaatjie Municipality had been declared an astronomy advantage area. The Northern Cape optical and radio telescope sites were declared core astronomy advantage areas. The Act allowed for the declaration of the Southern Africa Large Telescope (SALT), MeerKAT and Square Kilometre Array (SKA) as astronomy and related scientific endeavours that had to be protected.

You are requested to indicate the applicability of the Astronomy Geographic Advantage Act, Act No. 21 of 2007 on the application in the BAR/EIR. You must obtain comments from the Southern African Large Telescope (SALT) if the proposed development is situated within a declared astronomy advantage area.

Square Kilometre Array (SKA) SA

www.ska.ac.za

Cleo Forster
Project Development Manager
Juwi Renewable Energy
Metropolitan Centre
7 Walter Sisulu Avenue
Cape Town
8001

Email: cleo.forster@juwi.co.za

6th February 2018

Dear Cleo,

Re: Development of Skeurhok PV Facility – Phase 1, 2 and 3

This letter is in response to your email request to provide an assessment on the potential development of the proposed Skeurhok PV Facility, to be established in three phases, and the risk it may pose on the Square Kilometre Array Project.

As input into this assessment, you have provided SKA South Africa (otherwise known as the South African Radio Astronomy Observatory) with detailed impact assessments, for each of the three phases, undertaken by an EMC consultant ITC Services. These assessment took into account a historical assessment that considered the cumulative impact of facilities proposed to be established at this same location, prepared by MESA Solutions.

An assessment of the detailed impact assessment has been conducted by SKA South Africa. This letter serves to confirm the outcomes of this assessment.

i. The detailed impact assessment includes a technology risk assessment, radio frequency measurements undertaken within a laboratory environment, and measurements undertaken at a representative photovoltaic facility (Dreunberg);
ii. The assessment for Skeurhok Phase 1 indicates that, based on the measurement data available and assuming up to six similar facilities in the vicinity are established, up to 20dB of attenuation will

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be required to ensure no interference with the SKA (should only one facility be established in the vicinity, this would reduce to 12 dB);

iii. The assessment for Skeurhok Phase 2 indicates that, based on the measurement data available and assuming up to six similar facilities in the vicinity are established, up to 40dB of attenuation will be required to ensure no interference with the SKA (should only one facility be established in the vicinity, this would reduce to 32 dB);

iv. The assessment for Skeurhok Phase 3 indicates that, based on the measurement data available and assuming up to six similar facilities in the vicinity are established, up to 35dB of attenuation will be required to ensure no interference with the SKA (should only one facility be established in the vicinity, this would reduce to 27 dB);

v. Based on the assessments for all three phases, the required attenuation as identified above would be applied, primarily, to the tracker systems that are identified in the technology risks;

vi. It is likely that additional risks may be identified during the detailed design process of the facilities, such as design decisions concerning specific suppliers of equipment. These risks may result in a different RFI risk profile that needs to be accommodated during the design and construction of the proposed facilities;

vii. SKA South Africa supports the view that the required attenuation is achievable following appropriate design decisions and implementation of mitigation measures. In order to ensure that the identified risk of interference is mitigated, SKA South Africa requires that, as a special condition to environmental authorisations that may be considered for any, or all, of the proposed facilities, Juwi Renewable Energy be required to prepare and submit an EMC (Electromagnetic Compatability) Control Plan to SKA South Africa for approval prior to any detailed design and construction activities associated with the proposed facilities. This EMC Control Plan shall prescribe the manner in which Juwi shall achieve the required protection, including appropriate acceptance testing and verification processes prior to any construction activities of the proposed facilities being initiated.

This technical advice is provided by the South African SKA Project Office on the basis of the protection requirements of the SKA in South Africa, and does not constitute legal approval of the renewable energy projects in terms of the Astronomy Geographic Advantage Act, the Management Authority, and its regulations or declarations.

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Regards,

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SKA South Africa
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DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX H:

Comments and Responses Trail

COMMENTS AND RESPONSES TRAIL

This chapter presents the comments that were raised by stakeholders, I&APs and Organs of State during the preceding **Scoping Phase (including acceptance of Scoping from DEA)**, and responses to the comments and, if applicable, how these comments have been addressed in this EIA Phase. It is important to note that no comments were raised by stakeholders, I&APs or Organs of State following the submission of the finalised Scoping Report to the DEA for decision-making (in November 2018) and prior to the release of this Draft EIAR for a 30-day review period.

IDENTIFICATION OF ISSUES

An important element of the EIA Process is to evaluate the issues raised through the interactions with authorities, the public, the specialists on the EIA team and the project proponent. In accordance with the philosophy of Integrated Environmental Management, it is important to focus the EIA on the key issues, such as those issues that are considered critical for decision-making on the EA.

To assist in the identification of key issues, a decision-making process is applied to the issues raised, based on the following criteria:

- Whether or not the issue falls within the scope and responsibility of the proposed project; and
- Whether or not sufficient information is available to respond to the issue raised without further specialist investigation.

Issues were sourced by the EIA team from the following Scoping interactions:

- **Newspaper Advertisement** - In order to inform the public of the proposed project and invite members of the public to register as I&APs, and to inform the EIA consultant about specific issues or interests in the proposed project, the proposed Solar PV projects and EIA Processes were advertised in one local newspaper (i.e. "Gemsbok") on the 4th October 2017 (the newspaper is dated 6th October, but was distributed on 4th October 2017) during the Scoping Phase. A copy of the newspaper advertisement is included in Appendix D of this EIA Report.
- **Site Notices** – site notices describing the project as well as the contact details of the EAP were placed at several locations on site and nearby, as seen in Appendix F.
- **Email** – Emails were sent out as part of the public participation process undertaken for the 30-day review of the Draft Scoping Report (18 September 2017). Proof of this correspondence can be seen in Appendix E.

All comments received during the 30-day review of the Scoping Report for I&AP review are included in the Comments and Responses Table below, as well as in Appendix G of this EIA Report.

All comments received during the 30-day review of the Draft EIAR for I&AP review will be included in the Comments and Responses Table in the Final EIA report as well as in Appendix G of the Final EIAR. In addition to the comments and responses being in the tables below following the Draft EIAR review, all commenting I&APs will receive an email response from the EAP/Applicant.

The tables below summarise the comments and/or issues raised following the release of the Draft Scoping Report for I&AP review, together with a response from the EIA team, as well as comments included in the acceptance of the Scoping Report letter (dated 30/11/2017) received from the Competent Authority. Copies of the comments received are included in **Appendix G** of this EIA Report.

Table 1: Comments received following the release of the Draft Scoping Report for the 30-day review period, together with the response from the EIA team

*Please note that the comments are taken verbatim from the comments provided by I&APs

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
1.	Due to short notice, there is not enough time to go through the documentation. However, I would like to highlight some aspects that must be considered and responded to: 1. Should any impact occur within a CBA area (2017 version) within the Northern Cape, it will trigger a biodiversity offset. Accordingly, a biodiversity status assessment report must be prepared as well for consideration. 2. Confirmation must be obtained from SKA that the development planned will not negatively effect SKA activities or plans, nor will it be within their declared spatial area declared in Government Gazette.	*Elsabe Swart, Northern Cape Department of Tourism, Environment and Conservation*	20 September 2017, Email	**CSIR:** **Thank you for your comments.** Please see responses below numbered according to your comment: **1.** Thank you for noting this, however, the project does not fall within a CBA. The full ecological impact assessment will be included in the EIAR and will include any biodiversity impacts, should there be any. **2.** Please see **Chapter 7, Section 7.8.6** for the Terms of Reference for the SKA RFI study that has been undertaken. The full results of which will be included in the EIAR and a comment from the SKA on the development included. *Note: Comment was also responded to by the EAP via email on 27/10/2017*
2.	Please note that the applications for EA as well as the Draft Scoping Report will only be acknowledged upon receipt and after the application was screened and a reference number is allocated. Note that applications will only be accepted at	*EIA Admin, National Department of Environmental Affairs*	20 September 2017, Email	**CSIR:** This has been noted, thank you.

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	Reception during DEA official office hours. The documents were however received by the Department.			
3.	The Department confirms having received the application for Environmental Authorisation and Draft Scoping Report for the abovementioned project on 19 September 2017. You have submitted these documents to comply with the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. Please take note of Regulation 40(30) of the EIA Regulations, 2014, as amended, which states that potential Interested & Affected Parties, including the Competent Authority, may be provided with an opportunity to comment on reports and plans contemplated in Regulation 40(1) of the EIA Regulations, 2014, as amended, prior to the submission of an application but must be provided an opportunity to comment on such reports once an application has been submitted to the Competent Authority. Note that in terms of Regulation 45 of the EIA Regulations, 2014, as amended, this application will lapse if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless an extension has been granted by the Department in terms of Regulation 3(7) of the EIA Regulations, 2014, as amended. You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an	*Mr Sabelo Malaza, National Department of Environmental Affairs*	21 September 2017, Email	**CSIR:** Thank you for taking the time to acknowledge the application and the recommended actions will be undertaken accordingly.

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	Environmental Authorisation being granted by the Department.			
4.	Can you please send me the KMZ links for the 3x proposed project sites and power corridor to the sub station.	*Claude Bosman, Veroniva (Pty) Ltd - Energy*	21 September 2017, Email	**CSIR:** The KMZ links were sent through to the commentator on 21/09/2017 via email and receipt acknowledged.
	Your enquiry regarding approval from the SACAA with regard to PV farms refers. There is a SACAA process whereby permission is applied for wrt obstacles which could pose an aviation hazard. More information can be obtained at http://www.caa.co.za. Click on information for industry 'Obstacles' on the LHS. Forms, Part 139-27 and submit on the form itself. • Kindly provide a .kml (Google Earth) file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid. • Also indicate the highest structure of the project & the Overhead electric power transmission line. • Note that there may be other wind farms and PV farms in the area. Unique names are preferable. • Please always use the proposed PV farm name in the Subject box when corresponding via email with this office and indicate the name & address which should appear on the CAA approval/decline letter. • There is an assessment fee of R820 per	*Lizelle Stroh, South African Civil Aviation Authority*	21 September 2017, Email	**CSIR:** Thank you for this comment. An application to SACAA and proof thereof will be done in the EIA phase. *Note: Comment was also responded to by the EAP via email on 27/10/2017*

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	application. • For billing purposes: company name VAT nr. and postal details. • Kindly ensure that all the above data is forwarded. Incomplete data causes unnecessary delays.			
5.	It seems that the Sishen – Saldanha Iron Ore line (between Kenhardt – Rugseer) will not be directly affected by this proposal. This office in principle has no objection to the proposed application.	*Jaco Hanekom, Transnet*	22 September 2017, Email	**CSIR:** Thank you for this comment it is noted. *Note: Comment was also responded to by the EAP via email on 27/10/2017*
6.	Please find attached Eskom requirements for works at or near Eskom infrastructure. Please send me KMZ files of the development and proposed grid connection when available.	*John Geeringh, Eskom*	28 September 2017, Email	**CSIR:** Thank you for these requirements, they will be incorporated into the project design as well as the impact assessment. *Note: Comment was also responded to by the EAP via email on 27/10/2017* KMZ files were sent to the commentator on 10/10/2017 and acknowledgement of receipt email was received by CSIR.
7.	<u>This Department has the following comments on the abovementioned application</u>: **i.** Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in	*Sabelo Malaza, National Department of Environmental Affairs*	19 October 2017, Email and Post	**CSIR:** Thank you for your comments, please see responses below as per your corresponding numbering: i. This is noted and agreed.

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	the project description. **ii.** If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms. **iii.** The final SR must provide evidence that all relevant and identified competent authorities have been given an opportunity to comment on the proposed development. **iv.** Please ensure that all issues raised and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final SR. Proof of correspondence with the various stakeholders must be included in the final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. **v.** Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives			ii. This is noted and agreed. iii. Please see Appendix E for proof of correspondence to I&APs, Appendix C for the I&AP database and Appendix G for copies of the comments from I&APs. Please note that an application for this project has been created on SAHRIS (including the report attached as Appendix K), with the **Case ID: 11818.** No comments had been received by SAHRA at the date of submission of the FSR. iv. Please see response above. All comments have been responded to in this Appendix. v. Please see Chapter 5 for a description of any identified alternatives for the proposed activity that are feasible and reasonable, as per Appendix 2 of the EIA Regulations, 2014, as amended. vi. A hydrological comment has been included in Chapter 3, Section 3.3.8 Aquatic Environment (Surface Water, Drainage, and Wetland Ecosystems). A full hydrological study will be included in the EIAR. vii. Please see **Chapter 7, Section 7.8.6** for the ToR's of the SKA RFI Study. The full study and SKA engagement will be included in the EAIR. viii. Please see **Chapter 6** for confirmation that

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	will have on the environment and on the community that may be affected by the activity as per Appendix 2 of the EIA Regulations, 2014, as amended. Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2. **vi.** It is noted that the following activities that occur within watercourses have been applied for: G.NR. 983 Activities 12(x) and (xii); and 19(i). A separate hydrological assessment to assess the impacts on the surface hydrology of the proposed development area is required. The hydrological assessment to be conducted must assess, inter alia the following: ➢ Identification and sensitivity rating of all surface water courses for the impact phase of the proposed development; ➢ Identification, assessment of all potential impacts to the water courses and suggestion of mitigation measures; and, ➢ Recommendations on the preferred placement of the facility and all associated infrastructure and preference must be provided to the avoidance of the watercourses on the property. vii. The study area falls within the ambit of the Square Kilometre Array - South Africa. The impacts associated with radio frequency interference on the SKA must form part of the environmental impact assessment. The Department notes that the EAP and applicant have initiated engagements with the SKA-SA on this matter. The Department urges the EAP to ensure that the ToR for the study, should there be one necessary, be			impact statements will be done in the EIAR using existing information in the area for the following: social, agricultural, traffic. With regards to palaeontology, this will be assessed as part of the Heritage/Archaeology study in the EIA phase. Chapter 6 has been updated to reflect this information. ix. Please see **Chapter 1- EIA Team** for the inclusion of the names of the specialists. x. Please see **Chapter 7, section 7.8** for the updated ToR's as per this comment. xi. This is noted and agreed. xii. This is noted and will be abided to if applicable. xiii. Please see **Appendix B** for the EAP declaration under oath. xiv. Please see **Chapter 1, Section 1.6** and **Appendix A.** xv. Please see **Chapter 1, Table 1.6** for a checklist of requirements of a Scoping Report as defined in terms of Appendix 2 of GN R326. xvi. This is noted. *Note: Comment was also responded to by the EAP via*

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	included in the final scoping report. **viii.** The Department notes that the EAP recommends that full specialist studies not be conducted during the EIA process for impacts associated with: palaeontology, agriculture, social and traffic. The Department requires that a suitably qualified specialist provide an environmental impact statement in this regard. The impact statement must also advise on cumulative impacts as a result of the above-mentioned impacts. **ix.** You are hereby advised that the final SR must provide the names of the specialists that will conduct the various studies as outlined in the PoSEIA. **x.** The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: ➢ A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations. ➢ Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed. ➢ Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads and internal cables is allowed in the 'no-go' areas.			*email on 27/10/2017*

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	➢ Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' areas buffer if applicable. ➢ All specialist studies must be final, and provide detailed/practical mitigation measures and recommendations, and must not recommend further studies to be completed post EA. ➢ Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. ➢ A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. ➢ Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology approved with the acceptance of the scoping report. ➢ The significance rating must also inform the need and desirability of the proposed development. ➢ A cumulative impact environmental statement on whether the proposed development must proceed. **xi.** Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.			

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	xii. Where specialist studies are conducted in-house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist reports must be peer reviewed by a suitably qualified external specialist in the relevant field. The terms of reference for the peer review must include: ➢ A CV clearly showing expertise of the peer reviewer; ➢ Acceptability of the terms of reference; ➢ Is the methodology clearly explained and acceptable; ➢ Evaluate the validity of the findings (review data evidence); ➢ Discuss the suitability of the mitigation measures and recommendations; ➢ Identify any short comings and mitigation measures to address the short comings; ➢ Evaluate the appropriateness of the reference literature; ➢ Indicate whether a site-inspection was carried out as part of the peer review; and ➢ Indicate whether the article is well-written and easy to understand. **xiii.** In terms of Appendix 2 of the EIA Regulations, 2014, as amended, the report must include an undertaking under oath or affirmation-by the EAP in relation to: - the correctness of the information provided in the reports; - the inclusion of comments and inputs from stakeholders and I&APs;			

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	- the inclusion of inputs and recommendations from the specialist reports where relevant; - any information provided by the EAP to I&APs; and - responses by the EAP to comments or inputs made by I&APs. **xiv.** The affirmation of oath by the EAP must be witnessed and signed by a commissioner of oath. **xv.** In accordance with Appendix 2 of the EIA Regulations 2014, as amended, the details of- *(i) the EAP who prepared the report; and* *(ii) the expertise of the EAP to carry out Scoping and Environmental impact assessment procedures;* must be submitted. **xvi.** You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations, 2014, as amended. Further note that in terms of Regulation 45 of the EIA Regulations 2014, as amended, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of the these Regulations, unless an extension has been granted in terms of Regulation 3(7). You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998,			

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.			
	2. BACKGROUND AND COMMENTS ON DRAFT SCOPING REPORT The directorate: Biodiversity Conservation received and evaluated the DSR for the above mentioned project and based on the information provided, the project will have more terrestrial and aquatic ecological impacts, both during construction and operational phases. Construction Phase ➢ The proposed development will cause more disturbance on fauna, refugia and general change in habitat. ➢ The increased electrical light pollution will lead to changes in nocturnal behavioural patterns amongst faunal activities. ➢ Alteration in surface drainage patterns on account of construction activities will lead to rapid change in plant communities and general habitat structure both within the site and immediately adjacent to site. ➢ Alteration of surface water quality on account of construction activities will lead to changes in water chemistry. Operational Phase ➢ Increased shading of vegetation as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	*Wilma Lutsch Director: Biodiversity Conservation Department of Environmental Affairs*	13 October 2017, Email	**CSIR:** **Thank you for taking the time to comment.** Please see below responses to your recommendations: ➢ Please see Chapter 3, Section 3.3.7 and Section 3.4 for a scoping assessment of the biodiversity concerns of the site. A full biodiversity Specialist Impact assessment will be included in the EIAR. ➢ Please see Chapter 3, Section 3.3.7 and Section 3.4 for a scoping assessment of the aquatic concerns of the site. A full biodiversity Specialist Impact assessment will be included in the EIAR. **Please see the specialist response below** **Mr. Simon Bundy:** "After site reconnaissance, the proposed development area(s) will not encroach on to any wetlands, streams or rivers. Shallow dendritic drainage features, common to the region have been identified that are related to the prevailing geology and in some cases the movement of livestock. These features lack the edaphics, morphology and botanical habitat that would identify them as riparian or aquatic in function, however they will be considered from an ecological perspective within that report during the EIA process" ➢ Please see **Chapter 7, Section 7.5** for the approach to impact assessment which follows hierarchy: (1) avoidance, (2) minimization, (3)

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	➢ The fencing of the site, possibly with electric fencing, is likely to impact upon faunal behaviour, leading to the exclusion of certain species and possible mortalities. ➢ Abstraction of ground water for the cleaning of modules will alter the state of sub-surface water resources. **3. RECOMMENDATIONS** After reviewing and evaluating the potential impacts of the project on flora and faunal species, it is recommended that the following be included in the final Scoping Report (FSR). ➢ Biodiversity Specialist Impact Assessment is recommended to be included in the FSR in order to validate the predicted impacts and significance of the Skeerhok PV 1, as well as to propose any relevant mitigation measures. ➢ Aquatic Specialist impact Assessment must be compiled and submitted during the FSR. ➢ Mitigation options must be considered in terms of the following hierarchy: (1) avoidance, (2) minimization, (3) restoration and (4) offsets. ➢ The Critical Biodiversity Areas map must be submitted indicating all efficient selection and classification of land portions requiring protection and maintenance. ➢ The cumulative impacts of the area must be assessed and included in the final Scoping phase. ➢ An EMPr with full Operational Plan as well as any additional information that is outstanding as stated in the draft scoping report should be provided.			restoration and (4) offsets. ➢ Please note that the project does not fall within a Critical Biodiversity Area. More detailed information on this can be seen in **Chapter 3, Section 3.2.** ➢ Please note that the specialists reports which will form part of the EIAR will assess cumulative impacts. ➢ Please note EMPr with full Operational Plan will be provided in the Draft EIAR. *Note: Comment was also responded to by the EAP via email on 27/10/2017*

NO.	COMMENTS	COMMENTATOR	DATE	RESPONSE
	4. CONCLUSION The Directorate: Biodiversity Conservation has reviewed the submitted DSR and recommends that the above mentioned recommendations be included on the final scoping phase.			

Table 2: Comments included in the Acceptance of Scoping Letter following the submission of the final Scoping Report to the Competent Authority, together with the response from the EIA team.

DATE OF COMMENT, FORMAT OF COMMENT, NAME OF ORGANISATION/I&AP	COMMENT	RESPONSE FROM EAP/APPLICANT/SPECIALIST
30/11/2017 Email Department of Environmental Affairs: Strategic Infrastructure Development (Sabelo Malaza)	This Department has evaluated the submitted SR and the PoSEIA dated September 2017 and is satisfied that the documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2014. The SR is hereby accepted by the Department in terms of Regulation 22 (a) of the EIA Regulations, 2014. You may proceed with the Environmental Impact Assessment process in accordance with the tasks contemplated in the PoSEIA and the requirements of the EIA Regulations, 2014. All comments and recommendations made by all stakeholders and Interested and Affected Parties (I&APs) in the draft SR and submitted as part of the final SR must be taken into consideration when preparing an Environmental Impact Assessment report (EIAr) in respect of the proposed development. Please ensure that all mitigation measures and recommendations in the specialist studies are addressed and included in the final EIAr and Environmental Management Programme (EMPr). Please ensure that comments from all relevant stakeholders are submitted to the Department with the final EIAr. This includes but is not limited to the provincial Northern Cape Department of Environment and Nature Conservation, the Department of Agriculture, Forestry and Fisheries (DAFF), Birdlife South Africa, the IKheis Local Municipality, the ZF Mgcawu District Municipality, the Department of Water and Sanitation (DWS), the South African National Roads Agency Limited (SANRAL), the South African Heritage Resources Agency (SAH RA), the SKA-SA, the Department of Environmental Affairs: Directorate Biodiversity and Conservation Unit and the Department of Environmental	**CSIR:** Thank you for these comments. Please see responses below as per your corresponding numbering: All opening remarks are noted and agreed with. i. The Final EIAr will reflect the listed activities that are being assessed. Should this differ from the application form, an amended application form will be submitted with the FEIR. ii. Please see comment above in response. iii. This Chapter (Appendix H) includes all comments received from I&APs during the scoping process to date. Please see Appendix C for the I&AP database which includes all stakeholders that were notified of the review period on the reports. Proof of correspondence with the stakeholders can be seen in Appendix E. Chapter 4, Section 4.4 details the public participation process for this project followed as per Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. iv. This Appendix (Appendix H) constitutes the Comments and Responses Report, using the format as indicated in the aforementioned letter. v. Please see Appendix D, Page 3, for the English

DATE OF COMMENT, FORMAT OF COMMENT, NAME OF ORGANISATION/I&AP	COMMENT	RESPONSE FROM EAP/APPLICANT/SPECIALIST
	Affairs: Protected Areas Unit. Please ensure that the EIAr and EMPr comply with Appendix 3 and Appendix 4 of Regulation 2014I as amended before submission to the Department. You are also reguired to address all issues raised by organs of state and I&APs prior to the submission of the EIAr to the Department. Proof of correspondence with the various stakeholders must be included in the EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The EAP must give registered I&APs access to, and an opportunity to comment on the report in writing within 30 days before submitting the final EIAr to the Department. In addition, the following: i. The ElAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for. ii. The listed activities represented in the ElAr and the application form must be the same and correct. iii. Please ensure that all issues raised and comments received during the circulation of the Scoping Report from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity and Protected Areas Sections) in respect of the proposed activity are adequately addressed and included in the final ElAr. Proof of correspondence with the various stakeholders must be included in the final ElAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014, as	version of the Newspaper Advertisement placed in "Die Gemsbok" on 06 October 2017. vi. Please refer to Chapter 4, Section 4.7.6 for the ToR of the RFI Study. The RFI study, inclusive of all findings, is attached to this Draft EIAR as Appendix P. vii. Chapter 7 (Conclusions) summarises all the recommendations from the specialists, as well as the overall recommendation of the EAP. viii. This is correct. Please see Appendices I to N for an inclusion of the specialist studies and statements. ix. Please kindly see Appendix M for the VIA, as well as the details of the external reviewer (SiVEST). The review included a review summary letter which stipulated the required information as per the DEA's requirements, and the reviewer's response. **NB:** It must be noted that the recommendations for edits to be made to the VIA **have been made** post external review. The study in Appendix M reflects those requested changes by SiVEST. x. The Impact Statements for Social, Traffic and Agriculture were compiled by the CSIR using the extensive information available in the study area. These statements have been reviewed by qualified specialists in the field, and the details of this review is included in each statement, attached as Appendix N. The specialists commented on all of the listed required information as per your comment in a tabular

DATE OF COMMENT, FORMAT OF COMMENT, NAME OF ORGANISATION/I&AP	COMMENT	RESPONSE FROM EAP/APPLICANT/SPECIALIST
	amended. iv. A comments and response trail report (C&R) must be submitted with the final EIAr. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this comments letter. v. The draft EIAr must provide an English translation of the copy of the newspaper advertisement placed in "Die Gemsbok" on 06 October 2017. vi. The study area falls within the ambit of the Square Kilometre Array - South Africa. The impacts associated with radio frequency interference on the SKA must form part of the environmental impact assessment. The applicant must liaise with SKA-SA for advice on the terms of reference for the EMI and RFI detailed specialist studies and these studies must be completed, and included in the draft EIAr, with comments being obtained on these studies from the SKA-SA. vii. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice. viii. The following specialist studies have been identified to be conducted as part of the environmental impact assessment reports: ➢ Ecological Impact Assessment (including Terrestrial Ecology): Simon Bundy of Sustainable Development Projects (SDP) ➢ Avifauna Impact Assessment: Jon Smallie of Wild Skies Ecological Services ➢ Visual Impact Assessment: Luanita Snyman-Van der Walt of CSIR ➢ Heritage Impact Assessment (Archaeology and Cultural Landscape): Dr. Jayson Orton of ASHA Consulting (Pty) Ltd. ➢ Desktop Palaeontological Impact Assessment: Dr. John Almond of Nature Viva cc ix. Where specialist studies are conducted in-house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist	format in the introduction to the statements. xi. Please see each specialist study attached as Appendix I to N for an assessment of the cumulative impacts as per your comment. In addition, Chapter 6 and 7 include an assessment of the cumulative impacts. xii. Please see the RFI study attached as Appendix P, where consideration of the other renewable energy applications on the SKA have been assessed. xiii. Please see Appendix G and O for comment from SKA on this application (and other two Skeerhok Applications). xiv. Kindly refer to Appendix O for the correspondence between the Applicant and DEA (Mr. Coenraad Agenbach) confirming that the battery storage <u>does not trigger a listed activity</u> as well as any additional risk assessments. Please also see Appendix O, Section 8 for a description of the mitigations and management measures associated with this activity. xv. Please refer to Chapter 2 – Project Description – for this completed table. xvi. Please refer to Chapter 2, Table 2.1 and Figure 2.1 for a map and table of the corner co-ordinates of the site. xvii. Please refer to Chapter 2, Figures 2-1, 2-2 and 2-3 for the maps inclusive of these details. xviii. Chapter 4, Section 4.4 details the public participation process for this project followed as per Regulation 39, 40 41, 42, 43 and 44 of the

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	reports must be peer reviewed by a suitably qualified external specialist in the relevant field. Specifically, the Visual Impact Assessment to be conducted by the CSIR must be peer reviewed. The terms of reference for the peer review must include: ➢ A CV clearly showing expertise of the peer reviewer; ➢ Acceptability of the terms of reference; ➢ Is the methodology clearly explained and acceptable; ➢ Evaluate the validity of the findings (review data evidence); ➢ Discuss the suitability of the mitigation measures and recommendations; ➢ Identify any short comings and mitigation measures to address the short comings; ➢ Evaluate the appropriateness of the reference literature; ➢ Indicate whether a site-inspection was carried out as part of the peer review; and ➢ Indicate whether the article is well-written and easy to understand. x. The specialist input referred to in comment (viii) of the comments on the draft scoping report signed 19 October 2017; must additionally address the following: ➢ indicate whether the recommendation by the EAP that detailed studies are not required is acceptable; ➢ Indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable; ➢ Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated; ➢ Evaluate the appropriateness of the reference literature used; ➢ Indicate details and conclusions of the site-inspection if one was carried out as part of the specialist input;	EIA Regulations 2014, as amended. xix. Kindly refer to a latter from the Manager: Project Management Unit at Kai !Garib Municipality in Appendix O, for the confirmation of service availability. xx. Please see the Needs and Desirability table in Chapter 1 of this report which also details regional and locational motivation. xxi. Please see Chapter 2 and 3 (and the EMPr) for the final site layout map which has been informed by all environmental sensitivities. xxii. Please see Chapter 3 (and the EMPr) for a map inclusive of all environmental sensitivities on site. xxiii. Please see Chapter 3 (and the EMPr) for a map with the final site layout superimposed on the environmental sensitivities map. xxiv. A shapefile of the preferred development layout/footprint has been submitted to this Department in electronic format in conjunction with the submission of this Draft EIAR. The Environmental Management Programme (EMPr) requirements (i) to (xvi) have been included in the EMPr attached as Part B to this Draft EIAR. The EMPr is inclusive of the Final Site layout map as well as the layout overlain on the environmental sensitivities map. With regards to the comment on timeframes as per Regulation 45, please note that an extension motivation for submission of the Final EIAR to the Department was

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	➢ Indicate if the studies being referred to covers the preferred site; and ➢ Provide an indication on the cumulative impacts of these studies in relation to the proposed development. ➢ Must be conducted or input provided on by a suitably qualified specialist in the field. xi. Due to the number of similar applications in the area, all the specialist assessments must include a cumulative environmental impact assessment for all identified and assessed impacts. The cumulative impact assessment must indicate the following: ➢ Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, is hectares of cumulatively transformed land. ➢ Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. ➢ The cumulative impacts significance rating must also inform the need and desirability of the proposed development. ➢ A cumulative impact environmental statement on whether the proposed development must proceed. xii. The cumulative impacts on SKA must also be assessed for and considered in the EIAr. xiii. All communications and correspondences between the EAP and SKA-SA must be included in the EIAr. xiv. The impacts on the proposed battery storage facility must be adequately assessed. Furthermore, it is noted that the activity applied for the battery storage has a threshold of between 80m3 to 500m3, whereas the proposed battery storage facility will have a capacity of 1120m3. As such, the correct listed activity must be applied for and	submitted on 19th January 2018. This request was refused on 12/02/2018 by the Department. Thus, this application will follow the prescribed timeframes in Regulation 23(1). It must be noted that the three seasons of bird monitoring have been included in this DEIAR which is in line with the Regime 2 (Best practice guidelines, Jenkins et al., 2017). Note this excerpt from the Avifaunal Specialist Study (Appendix J): *"**NOTE:** For the purposes of this study we conducted **2 specialist site visits and 3 seasons** of on-site bird monitoring, in accordance with the best practice guidelines (Jenkins et al, 2017). The proposed project falls under **Regime 2** on account of being of 'medium' avifaunal sensitivity and greater than 150ha in extent. This means it requires 2 to 3 site visits of 3 to 5 days duration each over 6 months. We conducted 3 x 4 day site visits thereby slightly exceeding the minimum requirements in our view."* Thus, there is **no incomplete information in this report** in terms of Avifaunal impacts or information being withheld from the public in this regard. Please note that Appendices A to C in the Acceptance of Scoping Letter (which were referred to throughout the letter) have been adhered to in the relevant sections as per the responses below.

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	all the impacts related to the battery storage facility, including specialist studies if any must be conducted and assessed. xv. The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under point 2 of the EIA information required for solar energy facilities below. xvi. The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities. xvii. The EIAr must provide the following: - Clear indication of the envisioned area for the proposed solar energy facility; i.e. placing of photovoltaic panels and all associated infrastructure should be mapped at an appropriate scale. - Clear description of all associated infrastructure. This description must include, but is not limited to the following: ➢ Power lines; ➢ Internal roads infrastructure; and; ➢ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ➢ All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation. xviii. The EIAr must include the detail inclusive of the PPP in accordance with Regulation 41 of the EIA Regulations. xix. Information on services required on the site, eg. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided. xx. The EIAr must provide a detailed description of the need and desirability, not only providing motivation on the need for clean energy in South Africa of the proposed activity. The need and	

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	desirability must also indicate if the proposed development is needed in the region and if the current proposed location is desirable for the proposed activity compared to other sites. xxi. A copy of the final site layout map and alternatives. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following: • PV positions and its associated infrastructure; • Permanent laydown area footprint; • Internal roads indicating width (construction period width and Operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site eg. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • Substation(s) and/or transformer(s) sites including their entire footprint; • Connection routes (including pylon positions) to the distribution/transmission network; • All existing infrastructure on the site, especially roads; • Buffer areas; • Buildings, including accommodation; and • All "no-go" areas. xxii. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process. xxiii. A map combining the final layout map superimposed (overlain) on the	

<table>
<tr><th>DATE OF COMMENT, FORMAT OF COMMENT, NAME OF ORGANISATION/I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/APPLICANT/SPECIALIST</th></tr>
<tr><td></td><td>environmental sensitivity map.
xxiv. A shapefile of the preferred development layout/footprint must be submitted to this Department. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:
Postal Address:
Department of Environ mental Affairs
Private Bag X447
Pretoria, 0001

Physical address:
Environment House
473 Steve Biko Road
Pretoria

For Attention: Muhammad Essop
Integrated Environmental Authorisations
Strategic Infrastructure Developments
Telephone Number: (012) 399 9406
Email Address: MEssop@environ ment.gov.za

The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following:</td><td></td></tr>
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DATE OF COMMENT, FORMAT OF COMMENT, NAME OF ORGANISATION/I&AP	COMMENT	RESPONSE FROM EAP/APPLICANT/SPECIALIST
	i. All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted. ii. The final site layout map. iii. Measures as dictated by the final site layout map and micro-siting. iv. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process. v. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map. vi. An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken. vii. A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase. viii. A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats. ix. An open space management plan to be implemented during the construction and operation of the facility. x. A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late	

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	afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations. xi. A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment. xii. A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off. xiii. A fire management plan to be implemented during the construction and operation of the facility. xiv. An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion. xv. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems. xvi. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants. The EAP must provide detailed motivation if any of the above	

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	requirements is not required by the proposed development and not included in the EMPr. The EAP must provide the final detailed Site Layout Plan as well as the final EMPr for approval with the final EIAr as this Department needs to make a decision on the EA, EMPr and Layout Plan. Please ensure that all the relevant Listing Notice activities are applied for, that the Listing Notice activities applied for are specific and that they can be linked to the development activity or infrastructure in the project description. <u>You are hereby reminded that should the EIAr fail to comply with the requirements of this acceptance letter, as well as the requirements of the EIA Regulations, 2017, the project will be **refused** in accordance with Regulation 24(1)(b) of the EIA Regulations, 2014.</u> The applicant is hereby reminded to comply with the requirements of Regulation 45 with regard to the time period allowed for complying with the requirements of the Regulations, and Regulations 43 and 44 with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making. The reports referred to are listed in Regulation 43(1). Furthermore, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter II, Section 38 of the National Heritage Resources Act, Act 25 of 1999, then this Department will not be able to make nor issue a decision in terms of your application for Environmental Authorisation pending a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described	

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	in Chapter II, Section 38(8) of the National Heritage Resources Act, Act 25 of 1999. Comments from SAHRA and/or the provincial department of heritage must be provided in the ElAr. You are requested to submit two (2) electronic copies (DVD and USB) and one (1) hard copies of the ElAr to the Department. Please also find attached information that must be used in the preparation of the ElAr. This will enable the Department to speedily review the ElAr and make a decision on the application. You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, which stipulates that no activity may commence prior to an Environmental Authorisation being granted by the Department. **Annexure 1**	
	Format for the comments and responses trail.	The format has been adhered to (i.e. this table).
	A1. General Site information	A1. This can be seen in Chapter 1, Table 1.1 and Chapter 2. Copies of deeds can be found on Appendix O.
	A2. Sample of technical details for the proposed facility	A2. This table is reflected in Chapter 2, Table 2.2.
	A3. Site maps and GIS information	A3. A map package is being submitted to the Competent Authority together with the submission of this DEIAR in electronic format (CD) as per request xxiv. All the listed map details have been included in the shapefiles and the maps (if applicable). Certain aspects (i.e. slope analysis,

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		Appendix M) has been addressed in the relevant specialist studies in Appendices I to N.
	A4. Regional map and GIS information	A4. Please see Chapter 2 and 3 for regional locality maps inclusive of these requested aspects. In addition, the site layout maps and environmental sensitivity maps are also found in these chapters. The map package mentioned above that is being submitted with this DEIAR is also inclusive of this information in the form of shapefiles and PDF maps.
	A5. Important Stakeholders	A5. Please see Appendix C (I&AP database) for inclusion of these two listed stakeholders. In terms of comment from John Geeringh (Eskom), please see Appendix G for comment from him as requested.
	B. Agriculture Study requirements	B. Please note that some of the aforementioned requirements in this annexure relate to a full Soils and Agricultural Specialist Study, which was not conducted for this project (as noted by the CA in comment x. above). A soils and Agricultural Impact Statement was conducted (Appendix N1) by the EAP and externally reviewed. Due to the impacts found in this statement being **low to very low**, a full study was not deemed necessary by the peer reviewer, and hence some of these requirements listed in (B) fall outside the scope of the statement. However, the majority of these requirements have been discussed in the statement (as applicable), and further researched in the reference studies used.

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	C. Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007)	C. Please see the following sections where this request is addressed: • Comments from SALT in Appendix O • Comments from SKA in Appendix O • Full RFI study in Appendix P

DRAFT EIA REPORT

Scoping and Environmental Impact Assessment for the Proposed Development of a 100 MW Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, Portion 0, north-east of Kenhardt, Northern Cape Province

APPENDIX I:

Ecological Report

ECOLOGICAL & HYDROLOGICAL IMPACT ASSESSMENT:

Environmental Impact Assessment for the Proposed Development of a 100 MWac Solar Photovoltaic Facility Skeerhok PV1, near Kenhardt, Northern Cape Province

Report prepared for:

CSIR – Environmental Management Services

P O Box 320

Stellenbosch, 7599

South Africa

Report prepared by:

Simon C Bundy – SDP Ecological

P.O. Box 1016

Ballito 4420

South Africa

January 2018

SPECIALIST EXPERTISE

NAME Simon Colin Bundy
PROFESSION Ecologist
DATE OF BIRTH 7 September 1966
PLACE OF BIRTH Glasgow, Scotland
NATIONALITY South African / British
MEMBERSHIP OF PROFESSIONAL BODIES: South African Council of Natural Scientific Professionals No. 400093/06 – Professional Ecologist

KEY QUALIFICATIONS

Simon Bundy has been involved in environmental and development projects and programmes since 1991 at provincial, national and international level, with employment in the municipal, NGO and private sectors, providing a broad overview and understanding of the function of these sectors. Bundy has a core competency in coastal management and botanical issues and has worked on coastal projects in the Seychelles and Tanzania providing ecological and general environmental advice and support. Bundy has been involved in a number of renewable energy projects including the Kalkbult, Dreunberg and Lindes Solar Parks in the Northern and Eastern Cape, as well as wind energy and solar projects in the Western Cape and Rwanda. In such projects Bundy has provided both technical ecological support, as well as the undertaking of environmental impact assessments.

Allied to the above, Bundy has provided technical assistance to the "Save the Wild Coast" initiative through a technical report outlining the concerns relating to dune mining in and around the Xolobeni prospecting region while also evaluating critically, a number of environmental impact assessments and technical reports for various clients. Such evaluations have included "sea defence structures at Buffalo Bay, Western Cape", through the Nelson Mandela University. Bundy has also assisted iSimangaliso Wetland Park in its initiatives against unlawful developments in the Bangha Nek area. Bundy has also acted as expert witness on ecological issues on a number of legal cases.

From a technical specialist perspective, Bundy is competent in a large number of ecological methodologies and analytical methods including statistical methods ; multivariate analysis and ordination. Bundy is competent in wetland delineation and has formulated ecological coastal set back methodologies for EKZN Wildlife and the Oceanographic Research Institute. Bundy acts as botanical specialist for Eskom Eastern Region, with specific interest in coastal habitat forms.

EDUCATION

- 1990 - BSc Biological Science – University of Natal
- 2004: MSc - University of KwaZulu-Natal,
- 1997: Diploma Project Management, Executive Education
- PhD candidate, Department of Engineering, UKZN
- 1998: "Sustainable development initiatives" in Europe. Training Programme in Berlin, Germany

- 2000 : Training course : "Environmental Economics and Development". University of Colorado (Boulder) USA.
- 2008 : Certificate in Coastal Engineering : University of Stellenbosch.

SELECTED RELEVANT PROJECT EXPERIENCE

Task Team Chair and Project Ecologist: Task Team for Coastal Disaster Management, KwaDukuza 2007 – 2011. Management of coastal clean up programme immediately following March storm event of 2007. Activities included introduction of geofabric bag protection options, coastal retreat implementation and development of policy on coastal management following destruction of coastline.

Ecological Review of Lake Mzingazi for Umhlatuze Water: University of KwaZulu Natal – (2010)
Review of habitat structure and integrity of Mzingazi Lake System at Richards Bay required to interpret transformation of aquatic system over time and evaluate forecast for future reference.

Ecological Review and Agricultural Assessment – Dreunberg Solar Park, Eastern Cape : Scatec Solar – (2012). Ecological review of proposed solar park near Burgersdorp, with additional evaluation of veld carrying capacity.

Ecological Review and Rehabilitation Planning : Sodwana Bay :iSimanagaliso Wetland Park Authority – (2013 - 2014). Analysis and review of state of dune cordon in and around Sodwana Bay with consideration of the impacts of removing exotic trees from site to rejuvenate dune and beach dynamics

Ecological Review of Kalkbult Solar Park (2009). Ecological review and delineation of ecologically significant areas within the proposed Kalkbult Solar Park, near Potsfontein, Northern Cape.

PUBLICATIONS

Bundy, S. C. and Forbes, N. T., 2015. *"Coastal dune mobility and their use in establishing a set back line"* 9th West Indian Ocean Marine Science Conference 2015

Bundy, S. C. and Smith, A. M. 2009 *"Analysis of the Recovery of Two Separate Coastal Dune Systems Following the 2006 – 2007 Marine Erosion Event and Assessment of the Artificial Dune System in Coastal Management"* KZN Marine and Coastal Management Symposium, Durban South Africa.

Bundy, S. C., Smith, A. M., Mather, A. A. 2010. "Dune retreat and stability on the Northern Amanzimtoti Dune Cordon", EKZN Wildlife Conservation Symposium 2010

Smith, A Mather AM Bundy SC, Cooper AS Guastella L, Ramsay PJ and Theron A; 2010 "*Contrasting styles of swell-driven coastal erosion: examples from KwaZulu-Natal, South Africa*" Geology Journal", Cambridge University Press

Smith, AM, L Guastella , SC Bundy and AA Mather 2007 "*Coastal Storm Damage in the March 2007 Storm* SA Journal of Science 2007 "A Synopsis of Recent Storm Events"

Guastella L, Smith A Mather A and Bundy S 2008 "*As Memories Fade - A Review of the Post 2007 Coastal Erosion Events"* African Wildlife 32 / 2008

Smith A, Mather A, Theron A, Bundy S and Guastella L 2008 **"***The 2006-2007 KwaZulu – Natal Coastal Erosion Event in Perspective*" 2009 Contribution to the The South African Environmental Observation Network publication " Climate Change in Southern Africa"

Smith A and Bundy S 2009 "*Coastal erosion: reparative work on the Ballito coastline, KwaZulu-Natal, South Africa, was it enough?*" 2009 International Multi Purpose Reef and Coastal Conference, Jeffrey's Bay South Africa.

Smith AM, SC Bundy 2012 "Review of Coastal Defence Systems in Southern Africa" Article for Springer Scientific Publications through Ulster University, Pilkey and Cooper Eds

Bundy SC AM Smith, L Guastella 2012 "*A Review of Select Dune Rehabilitation Initiatives and a Proposed Methodology towards Ensuring a Prudent Approach towards the "Greening of Dunes*" VI International Sandy Beaches Symposium Emphakweni Port Alfred Various popular articles including documentaries on coastal and climate change issues

Smith AM, Bundy SC, Cooper JAG (2016). "*Apparent dynamic coastal stability of the south east African coast despite sea level rise*" Earth Surface Processes and Landforms DO! 10002/esp3917

SPECIALIST DECLARATION

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

ECOLOGICAL & HYDROLOGICAL IMPACT ASSESSMENT: Scoping and Environmental Impact Assessment for the proposed development of three 100 MW Solar Photovoltaic Facilities (Skeerhok PV 1, PV 2, & PV 3) line near Kenhardt in the Northern Cape Province

Specialist:	SDP Ecological and Environmental Services		
Contact person:	Simon C Bundy		
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Project Consultant:	Council for Scientific and Industrial Research		
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E-mail:	Kstroebel@csir.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, SIMON C BUNDY declare that --

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

SDP Ecological

Name of company (if applicable):

26/ 01 / 2018

Date:

EXECUTIVE SUMMARY

An Ecological Impact Assessment which included consideration of the habitat and faunal components of a portion of land on the Farm Smutshoek 395 was undertaken during the period June to November 2017. The assessment included desktop evaluations, as well as on site evaluations of the study area.

The investigations looked specifically at habitat form and structure and the relationship of such form and structure to the surrounding geology and geomorphology. The assessment sought to identify the ecological status of the site and identify key biophysical drivers within the site. Such information was then considered in respect of the proposed development, from which changes to the baseline ecological state could be anticipated or forecast and direct, indirect and cumulative levels of impact could be evaluated.

The site is considered to fall within a xeric environment (dry or semi desert) and as such is subject to significant seasonal to daily fluctuations in meteorological and physical factors which influence the prevailing ecology. In addition to the above, anthropogenic interventions associated with both the presence of livestock on the land in question, as well as indirect influences arising from the establishment of infrastructure (roads and rail) have served to alter other bio physical factors, including surface hydrology and the nature and composition of habitat.

The site forms part of the southern extent of the catchment serving the Soutrivier and Brakrivier rivers with minor dendritic drainage features that serve these systems being evident in the extreme north of the site. These drainage lines are inundated on an intermittent basis, often only following periods that be greater than a year. A buffer of 32 m has been applied to this feature in the north of the site. Wider buffers are considered to be inappropriate, given the nature of the terrain in question and the nature of the development.

With the exclusion of the minor drainage feature on site, it is evident that a suitably sized photovoltaic facility, can be established within the subject property. Mitigation measures that may address or redress identified potential impacts on the broader terrestrial landscape, as well as hydrogeomorphological features of and adjacent to the site, were identified during the course of the assessment and proposed in the Environmental Management Programme.

Having given due consideration to the site and its present ecological state, as well as the nature of the proposed development, it is our opinion that the development cannot be precluded from the site on ecological grounds, provided that suitable measures, as espoused in this report are implemented.

LIST OF ABBREVIATIONS

amsl	above mean sea level
CSIR	Council for Scientific and Industrial Research
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
ELP	Electrical light pollution
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
SANBI	South African National Biodiversity Institute
TWINSPAN	Two Way Species Indicator Analysis

GLOSSARY

Definitions	
Arid	Areas which receive low levels of rainfall or there is a moisture deficit.
Crepuscular	Fauna that is active at twilight
Dendrogram	A diagram showing relationships determined through a cluster analysis
Calcrete	A carbonate horizon formed in semi-arid regions. Also known as a caliche.
Dolerite	Form of igneous rock.
Drainage line	A geomorphological feature in which water may flow during periods of rainfall.
Edaphic	Pertaining to soils.
Fossorial	Pertaining to burrowing animals or those which live underground
Geophyte	Plants with underground storage organs.
Graminoid	Grasses or grass-like. Also monocotyledonous plants.
Gully	An erosion line exceeding 30cm in depth where water flow is concentrated and erosion resulting from flow is clearly evident.
Hydrogeomorphological	The interaction of geomorphic processes, landforms and /or weathered materials with surface and sub-surface waters.
Hygrophilous	Plants growing in damp or wet conditions

Multivariate analysis	A statistical method of evaluating non linear relationships between groups of data.
Rill	Shallow erosion lines less than 30cm deep
Xeric	A dry, as opposed to wet (hydric) or mesic (intermediate) environment.

COMPLIANCE WITH THE APPENDIX 6 OF THE AMENDED 2014 EIA REGULATIONS

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R326	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Pgs 1 - 4
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Pg 4
c) an indication of the scope of, and the purpose for which, the report was prepared;	S 1.1.2
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	S1.1.4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	S1
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	S1.3.3
g) an identification of any areas to be avoided, including buffers;	S 1.3.3
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	S 1.3.3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	S 1.1.4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	S1.5.1
k) any mitigation measures for inclusion in the EMPr;	S 1.5.1.1 + S1.6 + S1.8
l) any conditions for inclusion in the environmental authorisation;	S 1.8 + S1.9
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	S1.6
n) a reasoned opinion-	S1.9

i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	S 5.1
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Appendix H: Comments and Responses Chapter of the EIA Report
q) any other information requested by the competent authority.	N/A

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TABLES AND FIGURES

ECOLOGICAL IMPACT ASSESSMENT

This chapter presents the findings of the Ecological Impact Assessment (including Terrestrial Ecology and, Aquatic Ecology) that was prepared by Simon Bundy (of SDP Ecological and Environmental Services (SDP)) as part of the EIA for the proposed Skeerhok PV1 project, located near Kenhardt, within the Northern Cape Province.

1.1. INTRODUCTION AND METHODOLOGY

1.1.1. Scope and Objectives

As noted in Chapter 1 of the EIA Report, the establishment of a PV facility exceeding thresholds stipulated within the EIA Regulations requires an Application for Environmental Authorisation to be submitted to the relevant, mandated authority (i.e. the National Department of Environmental Affairs (DEA)), as well as the undertaking of an EIA Process. This Ecological Impact Assessment specialist study is being undertaken as part of the EIA Process in order to evaluate and inform on the bio-physical and ecological aspects of the receiving environment in relation to the proposed Skeerhok PV 1 facility. Skeerhok PV 1 is one of three sites that lie within an existing land parcel (Figure 1) that have been identified for the possible establishment of photovoltaic facilities. Skeerhok PV 1 lies on Portion 0 of Smutshoek Farm 395.

This biophysical evaluation of the land upon which Skeerhok PV 1 is proposed to be established was undertaken during the period June to November 2017 and entailed both a literature review of the region, as well as on site evaluations, during which specific primary data was collected and evaluated. In addition, the identification of key ecological features on and adjacent to the site was undertaken allowing for the interpretation of the prevailing habitat form and associated processes

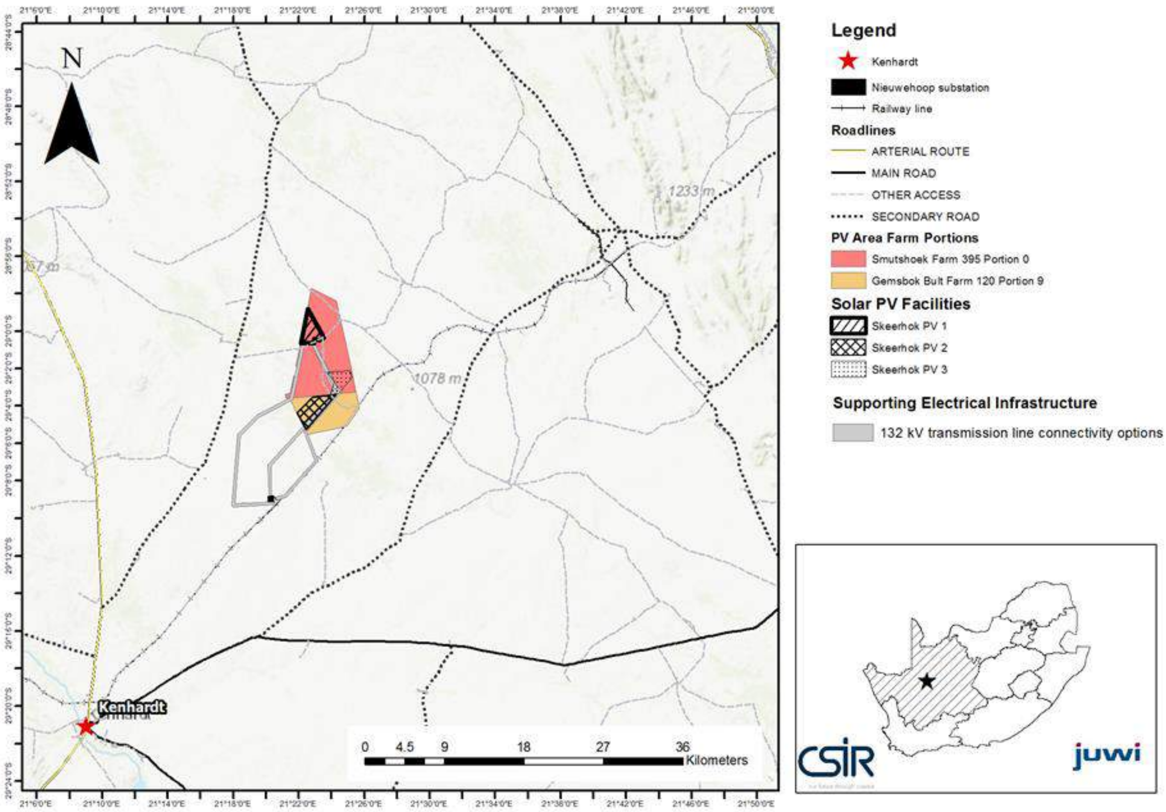

Figure 1. Map depicting the position of the Skeerhok photovoltaic facilities within the larger land complex and further indicating areas that are excluded from the development of PV facilities.

All data collected in the field and during the literature review was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level. In addition specific evaluation of data relating to habitat form and structure was undertaken, aiding in the identification of bio-physical anomalies within the prevailing environment. Such variance may be considered to be indicative of differing habitat forms, which under consideration, may be of higher order ecological value in relation of the prevailing environment.

1.1.2. Terms of Reference

The overall objectives of the Ecological Impact Assessment are to:

- Identify and establish an understanding of the site under consideration at a landscape scale of evaluation with particular consideration being given to aquatic or important terrestrial habitats, as they may be identified.

- Provide an evaluation and status of habitat composition and significance within the site in order to evaluate the potential impact of the proposed development on the ecological function of the site.

- Assess the actual and potential impacts arising from the proposed development on both the habitat and fauna within the study site. Such impacts may be directly applicable to the site and contained within the site boundaries, or may be indirect impacts, which may have ramifications outside of the site boundary ; or may be of a cumulative nature in terms of impacts arising from similar developments or activities within the region.

- Provide guidance on the implementation of mitigation measures that serve to moderate any negative impacts that may arise on site as a consequence of the development.

The Scope of Work is based on the following broad terms of reference, which have been specified for this specialist study:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial and aquatic environment and consequences for ecology.
- Compile a baseline description of the terrestrial and aquatic ecology (including avifauna) of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity (i.e. in terms of the major habitat forms within the study area, giving due consideration to terrestrial ecology (flora), terrestrial ecology (fauna) and freshwater ecosystems/wetlands).
- Provide specific ecological data in respect of the floral, faunal and aquatic components of the site using ground-truthing methods, with an emphasis on those areas considered to be of “high” and possibly, “moderate” sensitivity (based on the desktop study).
- Based on the desktop study, undertake field work and sampling across the site to record relevant data and to compile an overview of the habitat under review.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allow for the comparison of biological data.
- Consider wetlands (endoreic pans) and associated water resources within the site in terms of significance within the catchment, habitat value and significance and delineation of extent through preliminary on site evaluation and the use of aerial imagery interpretation (where these arise). Determine if a Water Use License is required.
- Undertake a faunal investigation on site, based on the points identified during the preliminary aerial photographic interpretation.

- Provide a detailed terrestrial and aquatic ecological sensitivity map of the site, including mapping of disturbance and transformation on site.
- Identify and categorize the potential direct, indirect and cumulative impacts (in line with the impact assessment methodology provided in Chapter 4 of the EIA Report) on the terrestrial and aquatic ecology, communities and ecological processes within the site during the construction, operation and decommissioning phases of the project.
- Provide input to the EMPr, including mitigation and monitoring requirements to ensure that the impacts on the terrestrial and aquatic ecology are limited.
- Compile an assessment report qualifying the risks and potential impacts of the development on terrestrial and aquatic ecology in the study area and impact evaluations.

1.1.3. Approach and Methodology

A literature review and desktop analysis was undertaken prior to the field investigation, utilizing various sources including the South African National Biodiversity Institute (SANBI) data and other relevant sources. Recent and historical aerial imagery of the site was reviewed in order to identify points for investigation during the field survey.

Utilising the above information, a field investigation was undertaken during the early summer of 2017 (September), whereby:

- Sites of geomorphological or topographic variance were identified and subjected to an evaluation of species present within a 40 m transect established across the selected site. Species were identified and collated according to a “presence – absence” method of evaluation (Figure 2). A total of 9 transects were established across the entire site.

- Additional random sample points were selected from other sites for comparative purposes.

- Any additional species of significance (e.g. *Aloe dichotoma*), not identified within the sample sites were also noted.

As explained below, the ideal period for the assessment of habitat within this region is following the onset of rains, which in this region, normally arises in the later summer months. Howsoever, it is believed that the sampling and analysis of the site during the early summer season provides suitable data and results to present an informed decision on the local ecology.

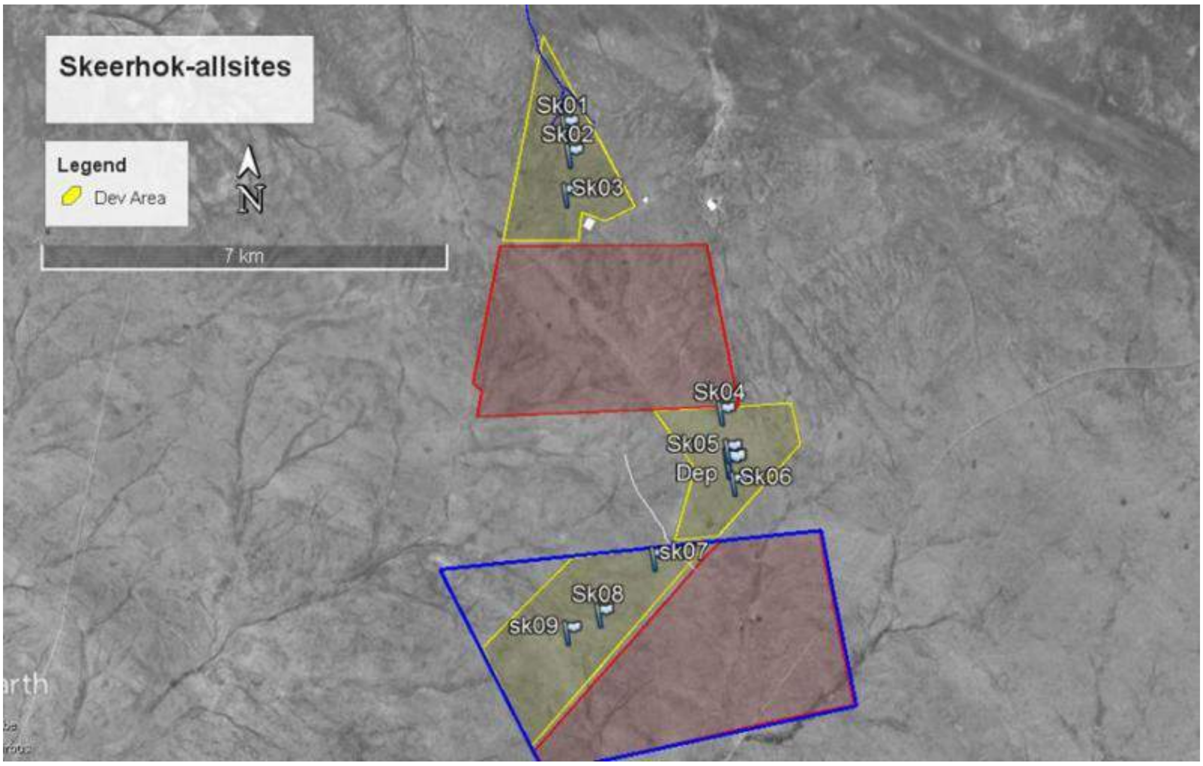

Figure 2. Aerial image depicting the sample points used to evaluate vegetation structure and composition across the three proposed photovoltaic sites. Source: Google Earth, 2015).

All data was collated and subject to evaluation using multi-variate statistical methods in order to:

1. Place the data into a hierarchy of similarities according to species composition and sample sites.

2. Give consideration to the overall structure of habitat within the subject site.

3. Identify any habitat anomalies that may be identified in such analysis.

4. Allow for the interpretation of such data in order to prioritise and evaluate habitat form and structure within the study area

In addition, using methods identified in the Department of Water Affairs' "A Practical Field Procedure for Identification of Wetlands and Riparian Areas" (2005), wetland and riparian areas were identified.

Such evaluations utilised both geomorphological, geohydromorphic edaphic conditions and botanical indicators in order to identify such components. In practise, only geomorphological components were utilised, as discussed below. Where riparian and wetland systems are identified and lie within 500 m of the proposed development/activity, an application in terms of Section 21 c and i, of the National Water Act (1998) is required to be submitted to the mandated authority.

It is important to note that no alternative site for the Skeerhok PV 1 project was proposed by the proponent; therefore no comparative exercise has been undertaken between sites. However, the applicant is pursuing two additional individual sites to the Skeerhok PV 1 facility.

Further consideration of the cumulative impacts associated with the development of Skeerhok at a broader landscape level of evaluation was undertaken. Such cumulative impact assessment was based upon the general understanding of "cumulative impacts" where such impacts "result when the effects of an action are added to or interact with other effects, in a particular place and within a particular time" (USEPA 1999). Evidently, this report will only consider the bio-physical components of the site in the landscape context over an arbitrary extent covering 20 kilometers from the site, as outlined within the approved Scope of Work included in the Final Scoping Report, dated November 2017. The assessment of the cumulative ecological and hydrological impacts was undertaken, based upon the following:

- A comparison of similar developments to the Skeerhok PV project land use within 20 kilometres of the Skeerhok site. The identification of sites was based upon information provided by the CSIR based on a dataset provided by the DEA and in-house data.
- Comparison was made across all identified sites in order to identify the habitat forms affected by the establishment of the PV facilities
- Comparison was made in terms of the "transformation" of Bushmanland Arid Grassland, which is the habitat form subject to transformation within the Skeerhok PV facilities
- The cumulative and comparative loss of Bushmanland Arid Grassland was subject to interrogation in order to identify the contribution of the Skeerhok PV facilities to the over-all loss of such habitat.

1.1.4. Assumptions and Limitations

The site assessment and collation of data was undertaken during the period 4 – 7 September 2017, at a period of seasonal change. Weather records for the region indicate that there had been a significantly improved rainfall during the summer period from January to March 2017 although summer rainfall is showing a distinct downward trend (www.worldweatheronline.com). Since a peak of 25mm in April 2017, there had however been a significant decrease in rainfall with only 1mm being recorded between July 2017 and the time of the site reconnaissance. Such meteorological stressors mean that some botanical species, in particular geophytes, are not generally evident. This may affect both the analytical and observation results of the investigation.

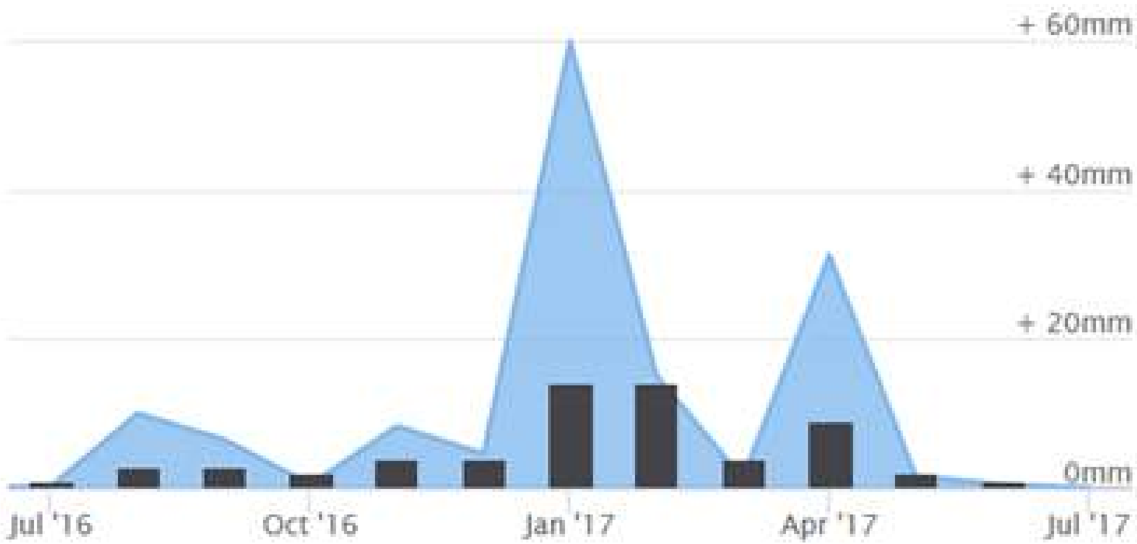

Figure 3. Rainfall records for Kenhardt July 2016 to July 2017: Rain days (█), Rainfall (X)
Source : www.worldweatheronline.com.

Allied to the above, the site investigation coincided with the regular, early summer dry period. As higher rainfall in the region is a late summer phenomenon, many botanical species remain dormant, until the advent of rains, effectively masking their presence.

In addition, the assessment was undertaken using a random sampling method. As such, minor outliers within the site may not have been evaluated. The random sampling method, if correlated to topography and other aspects, is however a robust method of evaluating habitat across a large area. Upon the finalisation of the detailed design of the proposed project, an evaluation of the final footprint should be undertaken subsequent to the issuing of an Environmental Authorisation (should one be granted for the proposed project) and upon completion of the detailed engineering prior to the commencement of construction).

In terms of the assessment of potential cumulative impacts included in this specialist study, these take into consideration certain developments that occur with a 20 km radius of the proposed project, as shown in Chapter 4 of the EIA Report.

1.1.5. Source of Information

This assessment was undertaken utilising:

- 1:50 000 topographic mapping sourced from the Surveyor General's office; and
- Aerial imagery sourced from Google Earth.
- Aerial imagery sourced from ESRI

In addition, use was made of the following data:

- Wetland and riparian habitat GIS data sourced from the National Freshwater Ecological Priority Area Programme of SANBI;
- SANBI veld types data; and
- Literature as referenced.

1.2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO TERRESTRIAL, AQUATIC ECOLOGY AND HYDROLOGICAL FEATURES

The proposed project will require the following key actions that are relevant to ecological aspects of the site:

1. Cordoning and fencing of the site during both the construction and operational phases. This component of the project usually entails the establishment of an electrified fence which remains *in situ* for the lifetime of the project (i.e. for the operational phase). For the construction phase, the construction area and construction site camp may also be cordoned off with temporary fencing.

2. Clearance or partial clearance of topographic features and significant vegetation where applicable during the construction phase.

3. Establishment of roadways (i.e. internal gravel access roads) and hardpanning of surfaces, with minor stormwater management aspects being introduced during the construction and operational phases.

4. Establishment of module arrays with concomitant cabling and provision of invertors within arrays. The footing of the module framework is founded into the ground using an earthscrew or similar method. Cables are placed in trenches to a depth of approximately 1.0 m.

5. Establishment of step up transformer and the on-site substation. This facility is expected to occupy an area of approximately 1 ha. It is fenced and isolated from the balance of the site.

6. Establishment of offices and related infrastructure.

7. A yard for storage and general operations will be set aside, adjacent to the built offices.

The establishment of site will thus entail *low to significant* alteration of the prevailing habitat, depending upon the final design and layout of the PV facility. A general sequestering of the subject area, through the fencing of the site from the surrounding habitat forms, thus arises.

A detailed project description is included in Chapter 2 of the Draft EIA Report, which includes dimensions and specifications of the proposed project components.

It is important to note that the information regarding the proposed 132 kV transmission lines connecting Skeerhok PV1 to the Nieuwehoop substation is indicatively provided in this report though is fully assessed in a separate Basic Assessment process.

1.3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

According to Mucina and Rutherford's veld type classification of 2006, Kenhardt and surrounding regions fall within the Bushmanland Arid Grassland veld type (NKb3). This veld type is located ostensibly south of the Orange River, but may include a number of smaller habitat forms within its broader extent.

The Skeerhok PV 1 study site lies to the north of a low elevated ridge which serves to divide the watershed of the two southern PV sites from the more northerly Skeerhok PV 1. Skeerhok PV 1 can be described as a generally level area of land with its highest elevation lying at approximately 1040m above mean sea level (amsl) in the south of the proposed site.

The area in general, can be considered to have a low rainfall of less than 200 mm per annum (SA Weather Services, *www.**weathersa**.co.za*) although the recorded average rainfall for the period 2000 to 2012 approximates 238 mm within an average of 51 rain days per year (www.worldweatheronline.com). As such the area has been described as a "semi-arid region" (Bailey, 1979). Using the Koppen-Geiger climate classification method (www.koeppen-geiger.vu-wien.ac.at), the area is classified "BWh", which is indicative of an *arid hot environment*, this classification is supported by Esler *et. al.,* (2006) who have defined areas with an annual rainfall of less than 200 mm as being "deserts". This *desert* status may be the case in the Kenhardt region under its lower rainfall periods. In addition, the highest, annual temperatures for the region are recorded between January and February, with maximum temperatures being 37˚C (www.worldweatheronline.com). Extreme temperatures thus coincide with the peak rainfall period. Such correlation may give rise to the low groundwater recharge rates projected for the region, this being estimated at approximately 0.03 mm / annum (Musekiwa and Majola, 2011).

With the above in mind, the most definitive physical drivers of the Bushmanland Arid Grassland veld type that lies within the study area, are meteorological and will relate to surface and subsurface hydrology. Other physical drivers will include localised geologies and edaphics

Terrestrial and hydrological components of the site are discussed separately below, however given the nature of the environment, a reductionist approach to the local ecology is difficult to justify and it follows that a more holistic approach to the ecology of the site should be pursued in its evaluation.

1.3.1. Terrestrial Habitat and Vegetation

The proposed Skeerhok PV 1 site is a generally level extent of land, approximately 390 ha in area. The site can be described as the typical graminoid dominated Bushmanland Arid grassland veld type with few elevated features. The local geology comprises primarily of a mix of sandy soils overlying predominantly dolerite and calcrete geologies with occasional quartzite outcrops (Figure 4).

Figure 4: Image indicating the generally level nature of the land on PV1 with a primarily graminoid vegetation and occasional woody species comprising of *Lyceum cinereum* and *Acacia karoo*. Note the calcrete exposure in the foreground.

A total of 9 sites across all three of the proposed PV facilities (PV 1,2 and 3) were evaluated on a *presence – absence* basis, using a 40 m transect (Figure 5) Species were identified and recorded at these points.

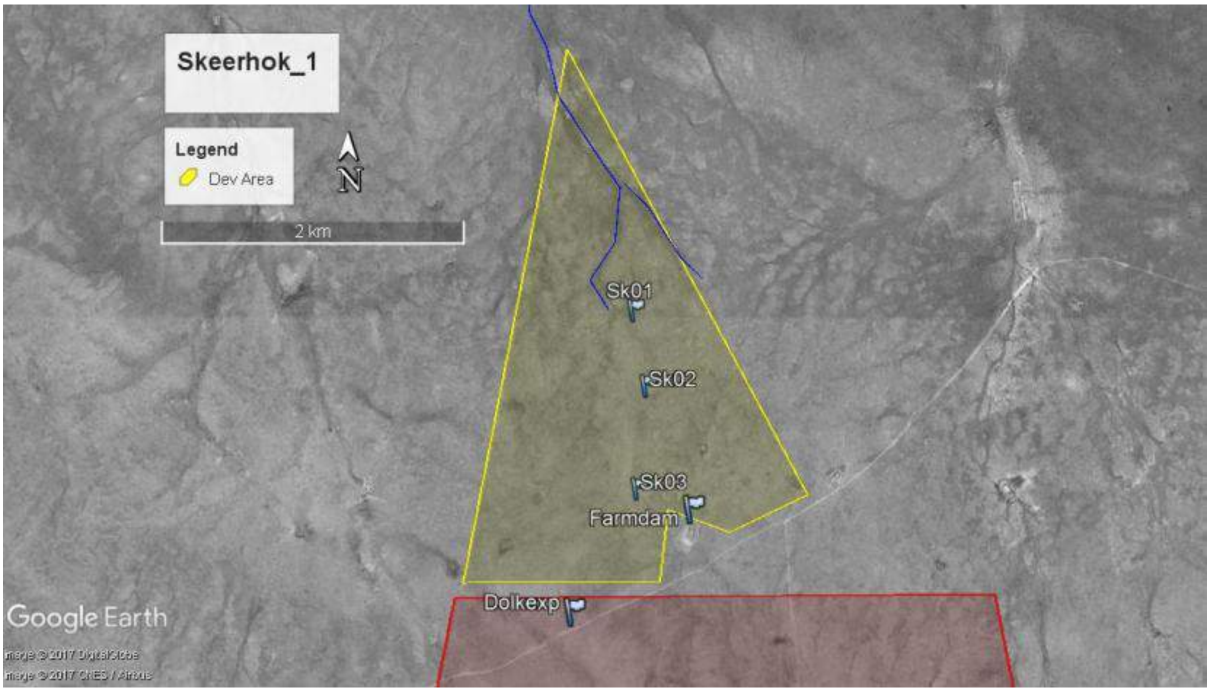

Figure 5 Map indicating sample points within Skeerhok PV 1

In general, the area appears to have been subject to low levels of grazing and has maintained a good cover of grasses, typical of this veld type. The dominant graminoid forms on site are *Aristida junctiformis* and *Stipagrostis ciliata.* The prevailing woody species are primarily *Lyceum* and *Acacia spp* providing some species diversity within the grassland environment. Only limited exotic invasion is evident within the site (primarily *Datura ferox*) with occasional specimens of *Aloe claviflora* being encountered (Figure 6).

Figure 6: *Aloe claviflora*, present intermittently across the site.

A list of species identified across site is presented in Table 1 below. In order to further evaluate the nature of the prevailing habitat on site, the primary collection of data relating to species composition across the proposed site was undertaken, with similar comparative exercises in the adjacent sites that have been proposed for the establishment of PV facilities. Utilising the data collected from the sites, a two way indicator species analysis (TWINSPAN) was undertaken to discern any similarities and variation between vegetation. The dendrograms depicting the results of the TWINSPAN, for vegetation communities encountered on site are presented below in Figure 7.

Figure 8 does not provide any clear indication of specific plant communities across the sample sites, with graminoid species (e.g *Aristida spp*) being evident within most associations. There is however, some indication of associations of more woody species (Acacia spp). This is typical of this grass dominated habitat and supports the contention that the subject site is generally an archetypal example of Bushmanland Arid Grassland with little transformation having been brought about through grazing or other farming activities.

Table 1. List of observed species within study site. Species of conservation significance are identified.

Species	Conservation Significance	
	NC NCA *	NFA#
Acacia karroo		
Acacia mellifera		
Aizoon elongatum		
Aloe claviflora	X	
Aptosimum spinescens	X	
Aristida ascensionis		
Aristida congesta		
Asparagus suaveolens		
Blepharis capensis		
Boscia albitrunca	X	X
Cadaba aphylla		
Datura ferox$		
Enneapogon cenchroides		
Eragrostis nindensis		
Eriocephalus encoides		
Euphorbia glanduligera		
Felicia muricata		
Lessertia annularis		
Lyceum cinereum		
Mesembryanthemum guerichianum		
Monechma incanum		
Pentzia spinescens		
Rhigozum trichotomum		
Riccia albornata		
Salsola tuberculata		
Schmidtia pappophoroides		
Stipagrostis anomala		
Stipagrostis ciliata		
Tetragonia arbuscular		
Tribulus cristatus		
Tribulus pterophorus$		

*NC NCA = Northern Cape Nature Conservation Act (1998) #NFA = National Forest Act (1998) $ = exotic

Further consideration of the data was undertaken using TWINPSAN in order to identify any similarities or variations between the sample sites. Figure 10 below, presents a dendrogram of these results

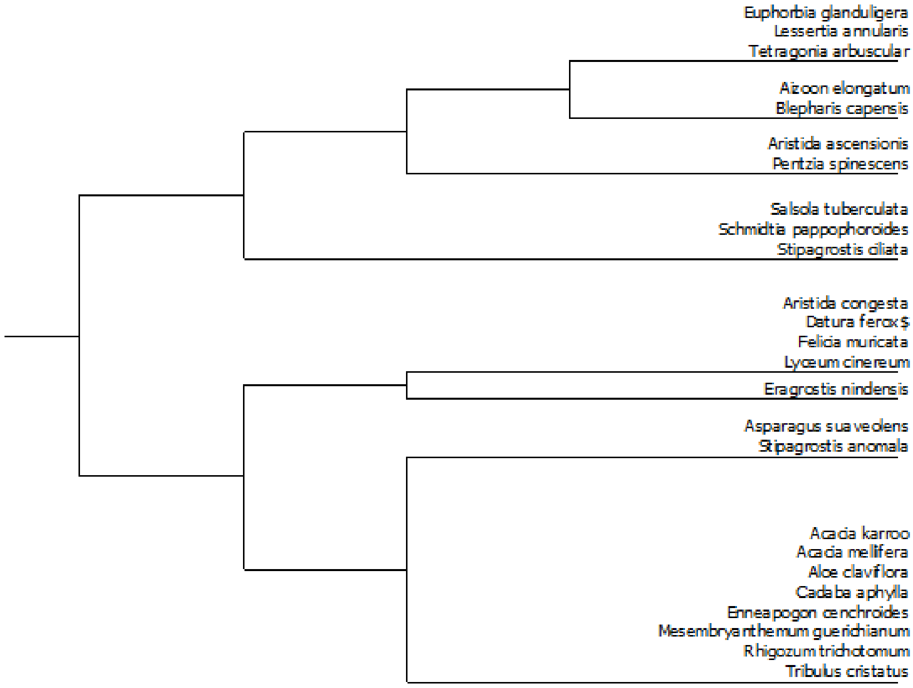

Figure 7: TWINSPAN Results presented as a dendrogram indicating vegetation species similarities and association

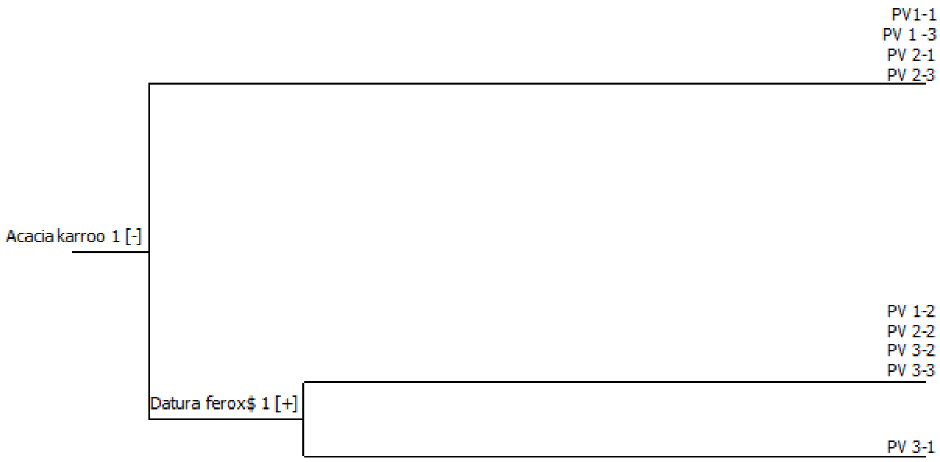

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Figure 8: TWINSPAN results presented as a dendrogram, indicating sample sites according to species composition.

Figure 8 indicates that there appears to be no significant variation in the distribution of the various vegetation associations across the site. As such, it is clear that the habitat form and structure across all sites is very similar. Such results are indicative of the presence of uniform ecological drivers, such as soils, soil depth, elevation and geology, while livestock grazing has probably been maintained at a very low intensity across all sites.

1.3.2. Hydrological features, "Aquatic" and "Riparian" Habitat

Within the site, surface flow is primarily by means of shallow channels that may vary on a temporal basis according to factors such as changes in the prevailing wind regime, vegetation growth or the movement of livestock. As such, these dendritic channels are often ephemeral in nature and do not show specific hygrophilous vegetation characteristics, nor do they show the presence of geohydromorphic soils. The absence of these indicators is due primarily to the fluctuating levels of inundation in these drainage features, over extended periods of time which is also driven by the intensity and erratic rainfall experienced in this region. Farmers in the region note that these features show short term inundation with water during high rainfall periods, in events that arise "every 4 to 5 years" (S Strauss pers. comm.). These features are often termed "whaadies", a term derived from the Arabic name for these intermittently flowing streams. Flow is generally sluggish under these conditions, and following the cessation of rains, the water rapidly drains from site on account of the percolative, sandy conditions, or is lost to evaporation. Soils in these systems, may as a consequence of such evaporation, prove to be slightly saline in nature (Mucina and Rutherford, 2006). Given the absence of definitive geohydromorphic indicators, the major drainage lines within Skeerhok PV 1 have been delineated according to hydrogeomorphological features and an apparent change in vegetation form from a sparse and arrested growth form, to a more verdant state, associated with drainage (Figure 9). Hydrogeomorphological features are indicated primarily by evidence of flow or deposition of materials (Brinson et al 1993; USDA 2008) while verdant vegetation establishment is a combination of both improved plant water relations and increased nutrient availability. Therefore, major drainage features are associated with a combination of both verdant vegetation structure and form as well as significant geomorphic indicators, while the depth and expanse of dendritic drainage features can also be utilized to distinguish between minor drainage lines (generally considered to be 'rills' and ephemeral in nature) and more permanent features ('gullies'), which are more defined in morphological character.

Although short lived, in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can be considered groundwater "recharge zones" in respect of the local subsurface hydrology. From a biotic perspective, the drainage lines do serve as seasonally important refugia and congregation points for *inter alia* invertebrates (e.g.

Class Odonata) and vertebrates (e.g. Order Anura) (faunal aspects are described further in Section 1.3.4 of this report). The saline conditions mentioned above may also prove to give rise to a more halophytic plant community.

Figure 9: An image indicative of a minor drainage feature located within the site. Note the verdant vegetation state comprising of a line of woody shrubs, compared to adjacent, less prolific vegetation, which appears arrested in form. Geological and edaphic factors may also influence growth form.

Surface drainage from the Skeerhok PV 1 site is through a number of dendritic drainage features located primarily in the north, that collate to form two seasonal drainage systems known as the Soutrivier and Brakrivier rivers (Figure 9). These watercourses eventually evacuate into the Orange River some 40 kilometres northwest of the site. Skeerhok PV 2 and 3, unlike PV 1 drain towards the south, into a seasonal drainage feature or watercourse known locally as Rugseerrivier. This feature has been dissected by both the main Sishen – Saldanha railway line and its associated roadway, however under high precipitation events the Rugseerrivier serves the Hartbeesrivier to the south of the town of Kenhardt and this river too, eventually feeds into the Orange River

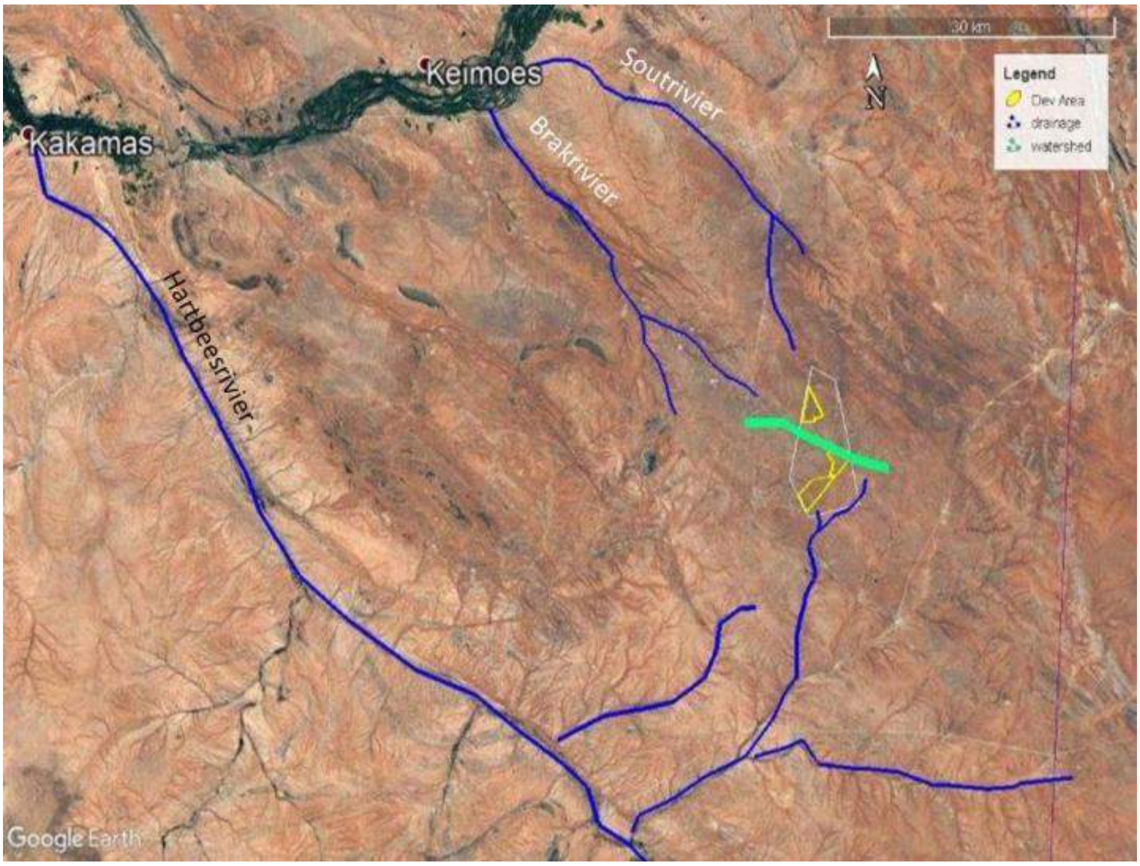

Figure 10: Map indicating drainage lines associated with the development areas and also indicating the watershed dividing the two catchments over which the Skeerhok PV Projects traverse. (Source Google Earth, 2015)

Two dendritic drainage features are evident in the north of the site (Figure 11) ,which can be described as shallow, geologically driven channels that may in turn be further excavated by the movement of livestock and in some cases, modification by the farmer. These features show very little evidence of regular flow and are generally identified through the more verdant growth of small woody shrubs such as *Acacia spp* and *Lyceum cinereum*. Figure 11 indicates the position and extent of a more significant dendritic drainage feature that lies to the north of the site and is the confluence of two minor features. These channels form the only, natural hydro geomorphic features within the Skeerhok PV1 site. The more geomorphologically distinct feature may be considered to be worthy of some level of retention and if the maintenance of free drainage from site is to be pursued, it is suggested that this feature remain generally unimpeded by significant development or transformation. Increasing levels of run off from site that may arise as a consequence of the establishment of the PV facility, even if generally latent in nature, may require that attenuators be placed within these drainage features, should excessive scour arise from a changing surface hydrological regime.

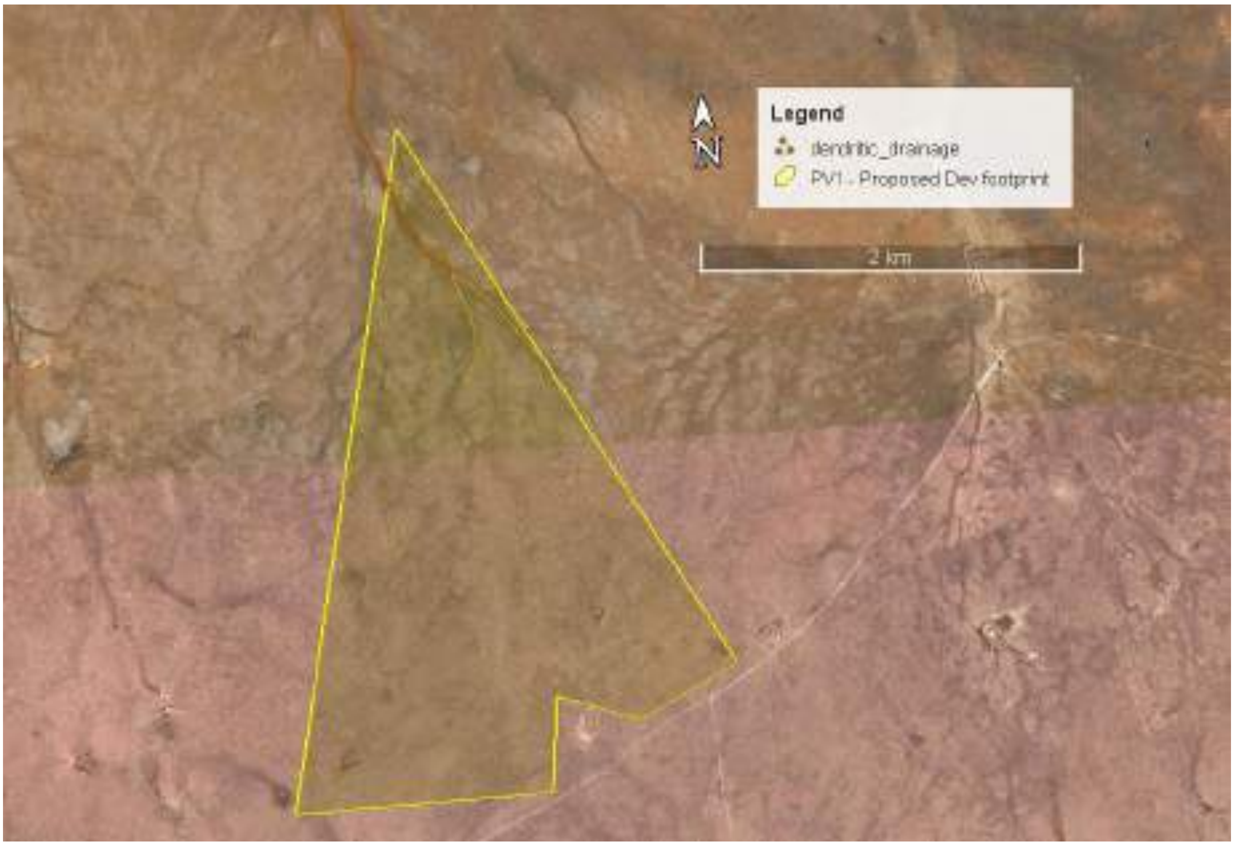

Figure 11 Map indicating the two minor dendritic drainage features lying to the north of Skeerhok PV1

1.3.3. 1.3.3 Habitat Sensitivity

Given the nature of the area as described above, those areas that may be considered to be of ecological significance within the site have been mapped and presented at a spatial level (Figure 12). Figure 12 identifies an area of land to the extreme north of the site, where dendritic drainage is evident and the confinement of surface flow to the abovementioned “major dendritic drainage features” arises during high precipitation events. The setting aside of these areas from development is based purely on the objective of reducing the level of transformation in the prevailing surface drainage regime from the site. No additional sites of ecological significance that should be excluded from the development footprint have been identified.

A 32 m “buffer” or “setback” around the identified drainage line has been established, which is an indicative “norm” recommended by the various authorities. This buffer is considered acceptable in light of the fact that hydrogeomorphic features are the primary dictate in the identification and delineation of the major drainage lines, rather than other functional features such as geohydromorphic soil conditions or botanical species diversity and compositional variation. It is evident that exclusion areas of greater extent around the major drainage line, would incorporate extensive tracts of land which are in no way indicative of the concentrated surface hydrology. The application of 32 m set back from such features is expected to accommodate both the variation in habitat structure and the erosive action associated with gullies and larger drainage features.

Figure 12. Spatial map of Skeerhok 1 showing "exclusion zones" around drainage features.

The nature of PV facilities, such as that envisaged at Skeerhok is such that much of the land occupied by the PV modules is left unimpeded by development and surface flow ostensibly follows the lay of the land (Figure 13). Some impediments to flow may arise at points around roadways or related infrastructure, however this is of limited consequence. In addition, the presence of the modules across the site, generally serves to alter plant-edaphic relationships through the concentration of water at points and increased shading, leading to improved water retention within soils. This situational change has low level ecological ramifications.

Fig. 13. Image of solar arrays indicating the limited influence that such structures generally have on the flow of surface waters within a solar facility.

1.3.4. Terrestrial Fauna

Fauna that are endemic to the region are considered to be typical of a xeric environment, with limited habitat variation across the study area giving rise to a primarily uniform distribution of such species.

As is typical of the region, a large number of fossorial and burrowing species, including mammals and invertebrates, were identified across the site in general. Such species included ground squirrel (*Xerus inauris)* (Figure 14) and suricates (meerkat) (*Suricata suricata*). Also sporadically present within the site are aardvark (*Orycteropus afer*), as well as the porcupine (*Hystrix africaeaustralis*).

Most larger mammals located within the subject site are not reliant upon the study area in particular and are likely to forage over extensive ranges that extend beyond the site boundaries. Estes (1992) indicates that suricates may use warrens for a number of months or possibly years, before relocating. Noted on other PV sites, suricates are quite capable of establishing warrens within solar parks following their construction, while aardvark and other fossorial species are able to excavate under fencing, which may have initially served to exclude them from the site. In some instances, animal intrusions into the PV facilities may prove to be a “risk” to both the animal and the operations of the facility. The foraging activities of aardvark may serve to expose underground cables, while in one instance the striped mouse (*Rhabdomys pumilio*) was noted to be a problem within PV facilities on account of its propensity to establish nests within cable trays and other small enclosures.

Identified during the site reconnaissance was the Bushmanland tent tortoise (*Psammobates tentorius verroxii*), (Figure 15), one of three sub species of tent tortoise within South Africa. This relatively small tortoise is not typical of the "tent tortoise family", in terms of its carapace shape and form. Although listed in the IUCN Red List of Threatened Species (http://www.iucnredlist.org) as 'least concern", the tortoise is generally sparsely distributed across the desert regions of South Africa. Other tortoise species that are likely to occur within the subject area include the serrated tortoise (*P oculiferus*) and possible species of padloper (*Homopus spp*). Tortoises are the species of terrestrial fauna most likely to be directly affected by the establishment of PV facilities. Tortoise succumb to habitat change within the PV facility (particularly where points of refuge may be altered – e.g. the loss of scrapes and burrows in the ground or changes in forage material), while fencing in general, may restrict the range of tortoise. The presence of electric fencing may also be lethal to tortoises that directly encounter live wires, as the animal withdraws into its carapace to avoid electrocution. If the tortoise is unable to extend its neck from the shell on account of the presence of the electric fence, it is rendered immobile, leading to the animal eventually starving to death through its inability to forage. Further mortalities may arise during the construction and operation phases, as a consequence of increased vehicular traffic affecting animals both on roadways that lie outside of the site and within construction areas.

Figure 14. Ground squirrel (*Xerus inauris*).

Figure 15. Bushmanland tent tortoise (*Psammobates tentorius verroxii*) identified on site.

Reptiles, smaller vertebrates and other invertebrates are also likely to show varying trends in populations across the subject site. As indicated above, habitat and climatic state are the major drivers of faunal presence within the region, with most species being transitory in any given area and their presence being subject to the availability of vegetation cover, water and other resources.

Table 2 below indicates species observed on site or evidence of their presence and includes species that are likely to be encountered in the broader region. The occurrence of such species within the site is likely, in respect of these animals either utilizing the site as refugia, or as part of a wider foraging range or territory. The legislation relating to these species is also presented.

Table 2. List of terrestrial species identified within site and likely to be present within the region/site. Species of conservation importance are also Identified.

		Observations	**TOPS (2007)**	**Conservation Importance (IUCN Red List) ***
Mammals				
Orycteropus afer	Aardvark	Possible foraging evidence found		LC

		Observations	TOPS (2007)	Conservation Importance (IUCN Red List) *
Felis nigripes	Black-footed cat			VU
Atelerix frontalis	South African hedgehog	Pers.comm J Orven 2015	Protected	LC
Canis mesomelas	Black back jackal			Not listed
Xerus inauris	Cape ground squirrel	Observed 2015		Not listed
Lepus capensis	Cape hare	Observed 2015		Not listed
Felis caracal ?	Caracal ?	Remains of prey 2015		Not listed
Procavia capensis	Rock dassie	Observed		LC
Suricata suricatta	Meerkat	Observed 2015		LC
Aethomys namaquensis	Namaqua rock mouse			Not listed
Hystrix africaeaustralis	Porcupine	Possible foraging evidence found 2015 and 2017		LC
Antidorcas marsupalis	Springbok	Observed		LC
Raphicerus campestris	Steenbok			LC
Cynictis penicillata	Yellow mongoose	Observed		LC
Reptiles				
Ptenopus spp	Barking gecko			LC
Naja nivea	Cape cobra			Not listed
Chondrodactylus angulifer	Giant ground gecko			LC
Cordylus spp	Girdled lizard		Protected	*C cataphractus* ; - VU
Psammobates tentorius veroxii	Karoo tent tortoise	Observed		LC
Geochelone pardalis	Leopard tortoise	Observed		Not listed
Bitis arietans	Puff adder			Not listed
Agama makarikarica	Spiny agama			Not listed
Amphibians				
Tomopterna cryptotis	Tremolo sand frog			LC
Invertebrates				
Locustana pardalina	Brown locust	Observed		Not listed
Pterinochilus spp	Baboon spider		Protected	Not listed
Seothyra spp	Buckspoor spider			Not listed
Family Vespidae	Various wasps	Observed		

		Observations	TOPS (2007)	Conservation Importance (IUCN Red List) *
Opistophthalmus spp	Burrowing scorpions?	Possible burrow entrance found	Protected	Not listed
Parabuthus spp	Parabuthid scorpion			Not listed
Family Hodotermitidae	Termite			Not listed

TOPS – Threatened or Protected Species (GN R151 of the National Environmental Management: Biodiversity Act (Act 10 of 2004))

IUCN – International Union of Conservation Networks

* LC = Least concern; NT = Near threatened; VU = Vulnerable; EN = Endangered

CR = Critically Endangered; EW = Extinct in the wild; NE = not evaluated; DD = data deficient

The impact of the photovoltaic facility on terrestrial fauna is considered to be "moderate to low", with the most vulnerable species that are likely to be directly affected by mortalities, being tortoise. The most significant effect of the PV facility on terrestrial fauna will however be through the exclusion of certain species from the site, which may in turn, favour other species that are capable of foraging and living within the secured PV facility. For example, predators may be excluded from the site to the benefit of prey species within the PV fence perimeter. Such state may give rise to low level skewing of populations at a localized level, with possible concomitant changes in habitat form and structure associated with such population change. A case in point may be the abovementioned populations of *R pumilio* that benefit from the exclusion of predators, improved nest sites and forage materials (increase in graminoid species over forbs) which in turn, may alter ecological processes and habitat form and structure within the PV facility.

1.4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The proposed establishment of a PV facility within the study site is considered to elicit a requirement for compliance with the following legislation.

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004)
2. The National Water Act (Act 36 of 1998)
3. The National Forest Act (Act 84 of 1998)
4. The Northern Cape Nature Conservation Act (Act 9 of 2009)
5. The Conservation of Agricultural Resources Act (Act 43 of 1983)

The potential applicability of the abovementioned acts to the subject site is provided below:

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004)

This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. The proposed development, taking place in the identified Bushmanland Arid Grassland environment, may not necessitate any particular application for a change in land use from an ecological perspective, however the effective disturbance and removal of species identified in Tables 1 and 2, as well as possible other species (i.e. TOPS species), will require specific permission from the applicable authorities.

In addition, the planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.

2. The National Water Act (Act 36 of 1998)

The National Water Act controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. Authorisation for changes in land use, up to 500 m from a defined water resource/wetland system will require an application for a Water Use Licence from the Department of Water and Sanitation. A Water Use Licence will be required in respect of the proposed development under Section 21 (c) and (i), of the Act, however such license should not preclude this development.

3. The National Forest Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified "protected trees". Listed species that may be encountered with the site include *Boscia* spp and possibly *Acacia erioloba*.

It is unlikely that an application for the "clearing of a *natural forest*", as defined within the Act, will be required on the site in question.

4. The Northern Cape Conservation Act

The Northern Cape Conservation Act under its pertinent regulation governs the disturbance of species listed in Tables 1 and 2 above, or possibly other species not yet identified on site. In particular, the relocation or redress of species such as *P. tentorius verroxii* will require a permit in terms of this Act to allow for the relocation or confinement of these and other species. Such requirement may arise where the authorisation holder may wish to remove species from site and relocate to another site, or possibly hold specimens for a short period. Permits of this nature have been issued to other Independent Power Producers in order to remove nuisance species such as aardvark.

5. The Conservation of Agricultural Resources Act

Invasive plant species that should be removed or maintained only under certain commercial situations are identified in terms of the Conservation of Agricultural Resources Act (CARA). This Act will be applicable to the project if and where such plants arise within or adjacent to the project area. Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction.

As the proposed sites are not within protected areas, nor within 5 kilometres of a protected area, are not within 10 kilometres of a World Heritage site and do not form part of a critical biodiversity area (CBA), the various regulations within the National Environmental Management Act and the NEM Protected Areas Act are not applicable to this site. It is also noted that the site does not fall within any expansion area in terms of a conservation strategy for the Northern Cape.

1.5. IDENTIFICATION OF KEY ISSUES

1.5.1. Key Issues Identified During the Scoping Phase

As indicated in both this report and the environmental scoping report, the subject site is to be considered a xeric to semi-xeric environment, with limitations in the presence of aquatic or wetland environments in both temporal and spatial terms. With this in mind, consideration of issues arising from the proposed development is undertaken at an integrated level. The following key issues were identified:

1.5.1.1 Construction Phase

The following potential impacts during the Construction Phase can be summarised:

- Alteration of habitat structure and composition;
- Ousting (and recruitment) of various fauna;

- Changes in the geomorphological state of drainage lines (i.e. changes to surface drainage patterns) due to construction activities leading to change in plant communities and general habitat structure, within the site and immediately adjacent to it;
- Increased electrical light pollution, leading to changes in nocturnal behavioural patterns of fauna;
- Exclusion or entrapment of (in particular) large fauna, on account of the fencing of the site;
- Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points;
- Changes in subsurface water resources;
- Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) as a result of construction activities; and
- Exotic weed invasion.

1.5.1.2 Operational Phase:

The following potential impacts during the Operational Phase can be summarised:

- Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as “shading of vegetation” from arrays;
- Ousting (and recruitment) of various fauna on account of long term changes in the surrounding habitat/environment;
- Changes in the geomorphological state of drainage lines on account of long term climatic changes and the concomitant change in the nature of the catchment on account of the land use change;
- Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities. Such changes will be related to the long-term activities on site, but are likely to be negligible; and
- Exotic weed invasion as a consequence of regular and continued disturbance of site.

1.5.1.3 Decommissioning Phase

Such alterations and changes will be dependent upon the expectant post-decommissioning land use. However, abandonment of the site would probably result in:

- A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise;
- A reversion of present faunal population states within the study area;

- Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment; and
- Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures.

1.5.1.4 Cumulative Impacts

The cumulative impacts associated with the proposed Skeerhok PV Projects must be seen against the background of the establishment of other, similar PV projects within the region. It is evident that the incorporation of other land use changes within the region cannot be applied in terms of evaluating cumulative impacts on account of the nature of the prevailing land use (primarily livestock ranching) and the rural and hence sparse and sporadic nature of such changes as they may apply to the region. The method employed in evaluation of the cumulative impacts of a number of similar PV projects in the region is described below.

The consideration of cumulative impacts is of relevance to expansive projects such as this on account of the fact that they generally result in the homogenisation of the landscape, which in turn gives rise of habitat loss and the reduction in biodiversity (Selman 2006). Such homogenisation within the terrestrial environment also has bio-physical ramifications in the aquatic environment.

A total of 12 other large scale PV facilities were identified (within 20km of the three proposed Skeerhok PV projects) as having been authorised or are currently under consideration by one or more authorities. In total 15 PV projects lies within this delimited area. These projects are identified in Figure 16 below.

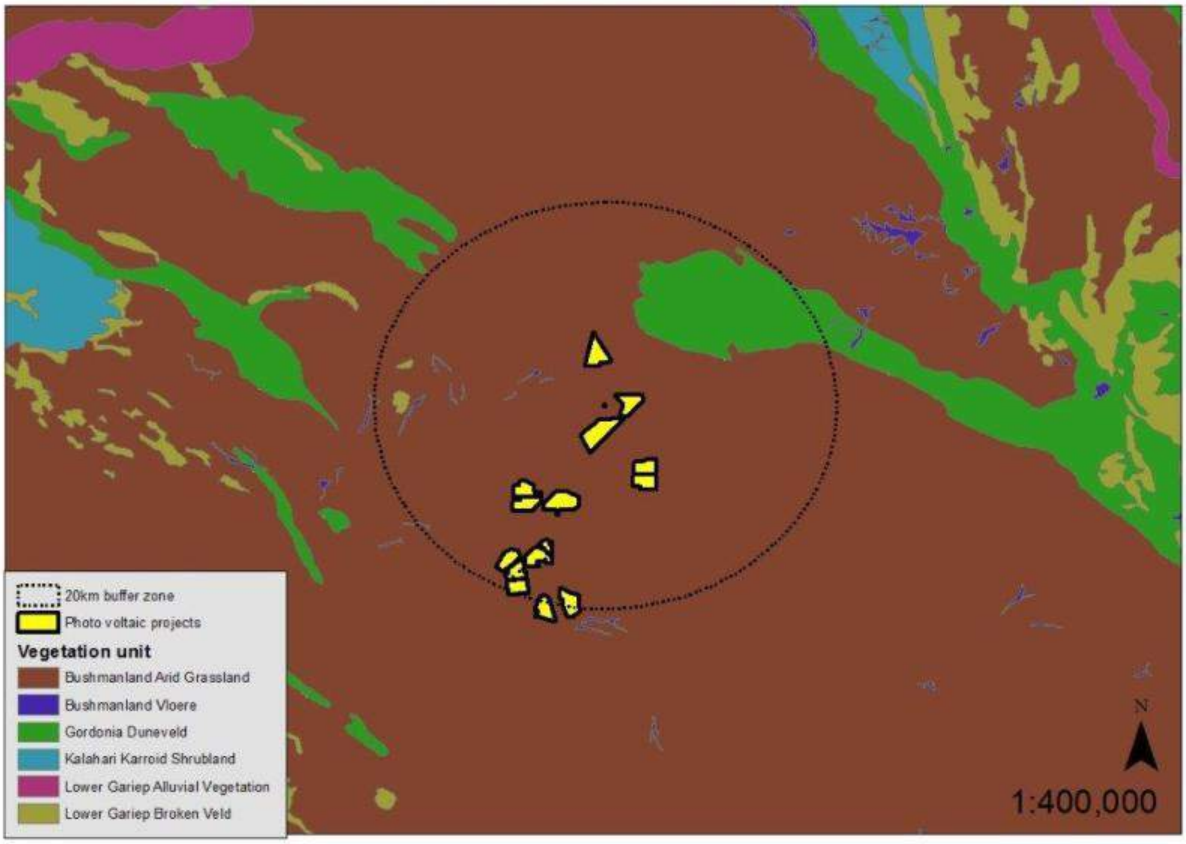

Figure 16. Map indicating position of the proposed photovoltaic projects located within a radius of 20 kilometres of the Skeerhok site

Cumulative impacts from a terrestrial ecology perspective

The identified sites have not been subject to further interrogation and it is therefore unclear as to whether some areas within these sites have been set aside or excluded from development. However, based on the information at hand, it is evident that:

- Individual PV sites vary between 240 ha and 500ha in extent
- All sites fall within the Bushmanland Arid Grassland veld type (Figure 16)
- Five local catchments are affected by these facilities, namely the catchments of the Soutrivier, Brakrivier, Wolfkopseloop, RugseerRivier and N'Rougas se loop. These catchments are indicated below in Figure 17.

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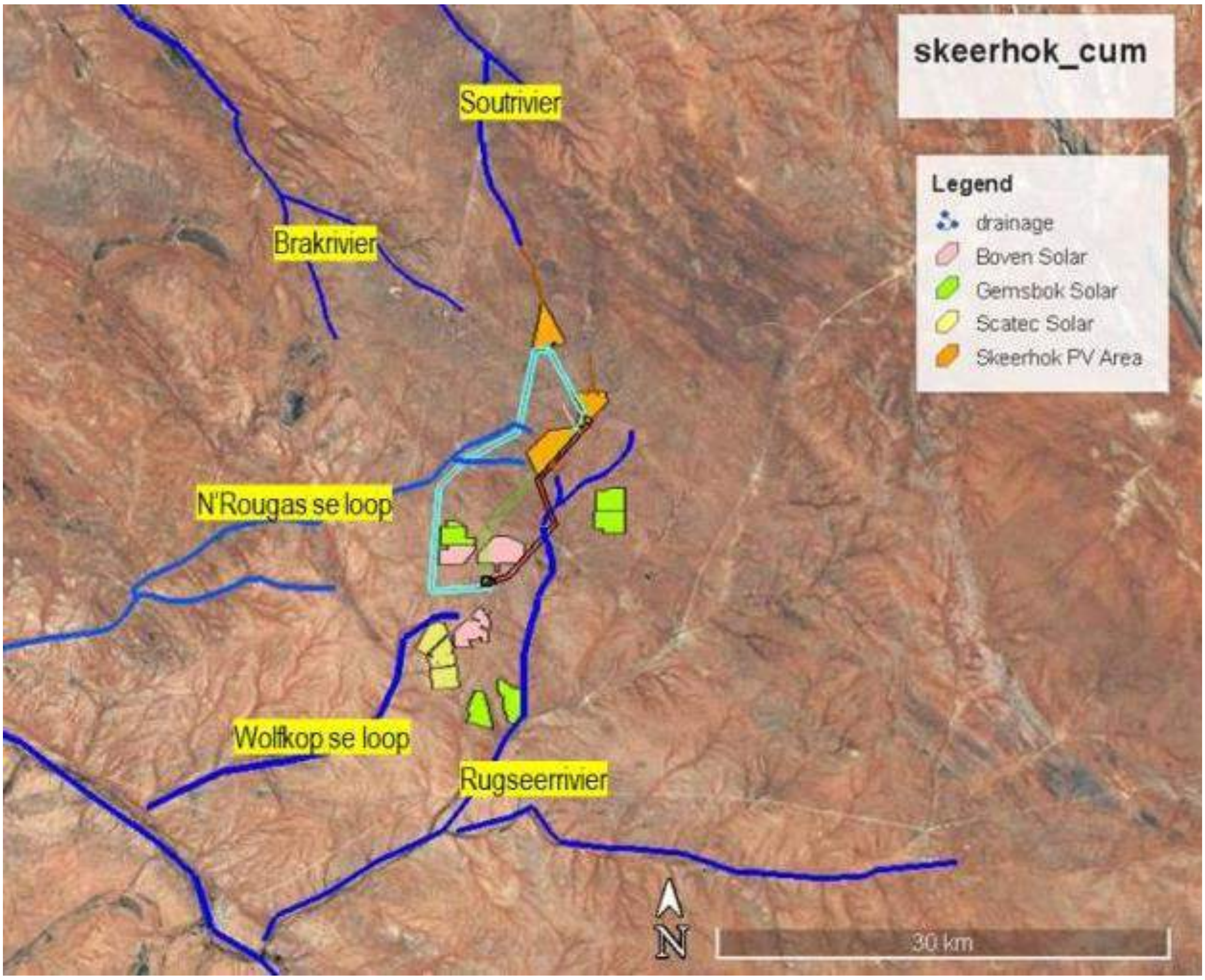

Figure 17. Map indicating the various PV projects that fall within 20km of the Skeerhok site and the relevant catchments

Figure 18 below identifies the contribution that each of the 15 PV projects that fall within the identified 20km radius towards the transformation of Bushmanland Arid Grassland and the homogenisation of the landscape. From Figure 18 it is clear that Skeerhok PV 3, Gemsbok PV 1 and Gemsbok PV2 are the three largest PV projects falling within the study area, with a combined area that approximates 20% of all 15 areas identified as being under consideration as PV facilities. The total area of all 15 PV facilities amounts to 4815 ha, which approximates 0.12% of the identified area that constitutes Bushmanland Arid Grassland veld type.

While the habitat affected by the PV facilities may be small from a quantitative perspective, some consideration should be given to the following qualitative but cumulative impacts that are likely to arise, these include:

- The "homogenisation of the landscape", as explained above.

- The increased dissection of habitat on account of increasing levels of infrastructure. The proposed PV facilities and powerlines, as well as associated service roads and other infrastructure will give rise to the further dissection of habitat within the region.

- The increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on various sites and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.

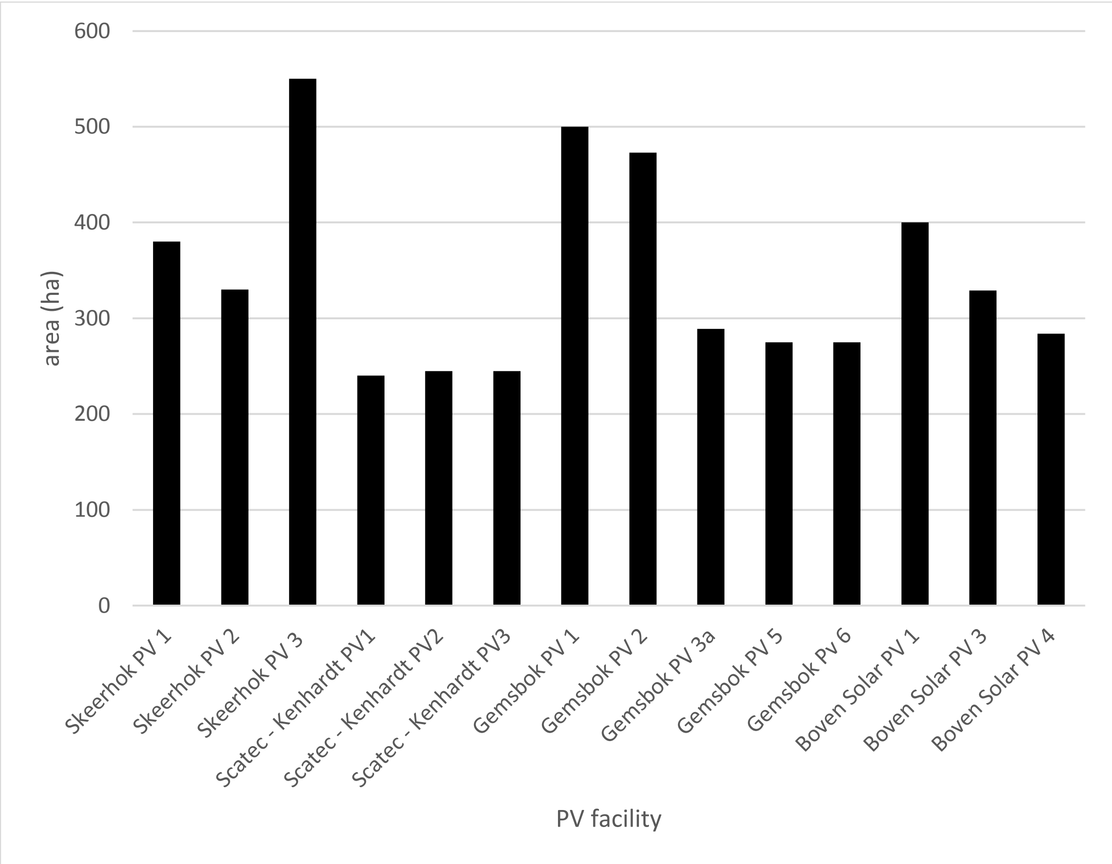

Figure 18. Graph indicating extent of PV projects and contribution of each project to the potential transformation of Bushmanland Arid Grassland veld type.

- Increased and expanded anthropogenic influences across the region. The nature of the surrounding PV facilities, electrical infrastructure and other support infrastructure suggests that human activity will arise at points that are presently only intermittently visited by a farmer or his staff. Greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.

- Increased ELP levels. Light pollution may be associated with all built structures associated with the proposed projects. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points.

- Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the various sites, increasing noise levels, in particular the low level sound emanating from buzz bars and the proposed on-site substations, together with the other electrical infrastructure associated with the projects, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction).

- Vegetation and habitat alteration - change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites.

- Recruitment and behavioural change in fauna - changes in ecological processes and habitat.

Cumulative impacts from a hydrological perspective

The establishment of the 15 PV facilities within the region, will see an altered surface hydrology arising within the landscape. Increasing areas that have been levelled or are dominated by built structures, will see localised changes in surface hydrology across specific points within the region. As shown in Figure 17, five major local drainage features are evident within the study area, which in turn serve either the Hartbees River to the west or discharge directly into the Orange River to the north and north east. Ultimately all surface flow discharges into the Orange River. Figure 19 identifies the local catchment most affected by PV facilities within the 20km radius of the Skeerhok Projects.

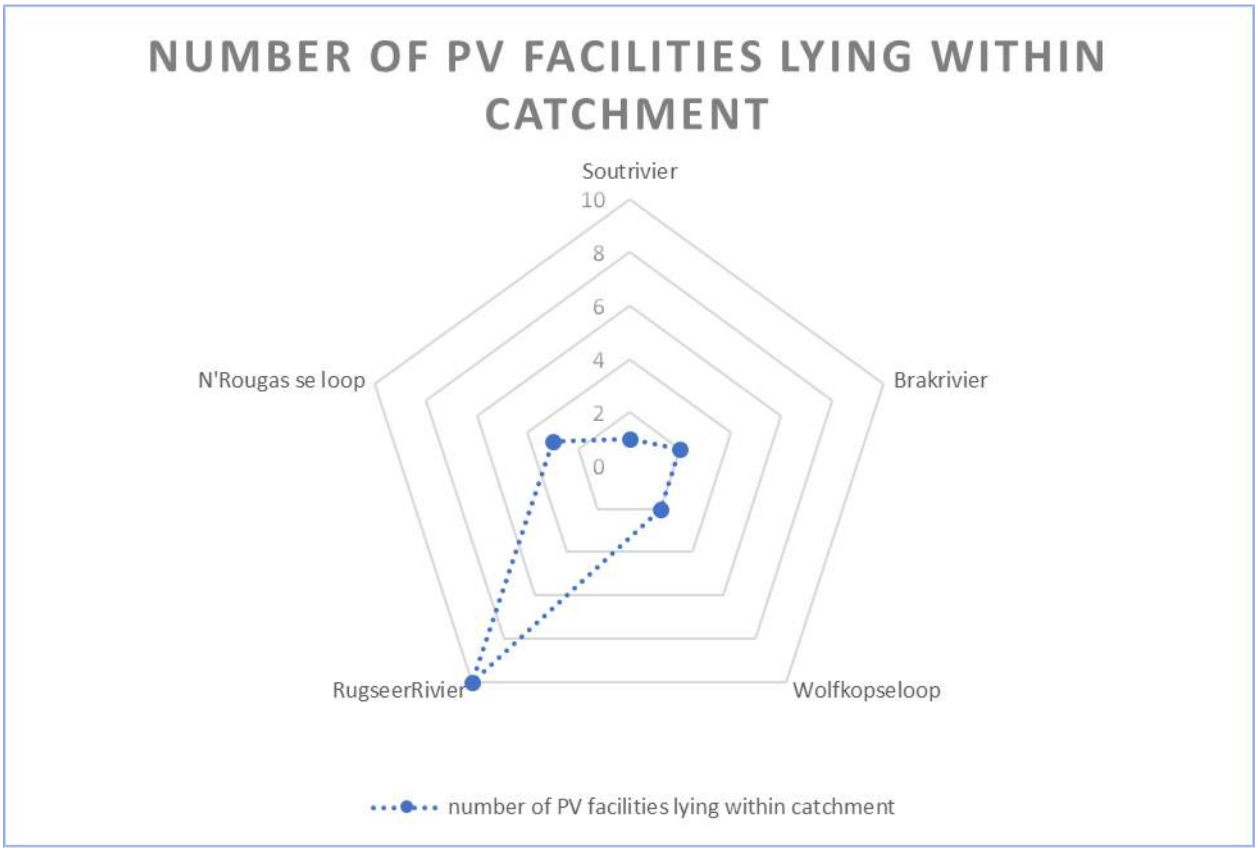

Figure 19. Graph indicating catchments affected by PV facilities.

From Figure 19, it is evident that the Rugseer Rivier to the south of the study area is most affected by the proposed solar park developments, with 10 of the proposed projects lying entirely or in part within its catchment. Notably, Skeerhok PV 1 drains northwards into the upper catchment of the Soutrivier and is the only project within the catchment of this system.

Though many of the cumulative impacts associated with these developments are difficult to forecast and cannot be avoided, the introduction of mitigatory measures at a site specific basis may assist in moderating the impacts described above at a landscape level. In evaluating the impact of the 15 projects identified and adjudicating on a limitation of the number of projects to 6, as stipulated by the DEA, such decision-making, from an ecological perspective should best be undertaken through a review of *inter alia*; extent of development, level of transformation within existing sites, eco-morphological factors within the individual sites and impacts on individual catchments. It follows that those sites which have the lowest extent and have limited eco-morphological impacts would perhaps be preferred, while from a regional perspective it is possibly prudent to avoid the concentration of solar parks into particular catchments, preferring to disseminate surface hydrological change across a number of catchments.

1.6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

The proposed development of the PV facility on the study site indicates that the land use change should arise primarily to the south of the site, thus avoiding the drainage features identified to the north. A number of potential impacts have been identified in Section 1.5.1. These potential negative impacts are given further consideration below, with possible mitigation measures being proposed.

Construction Phase

1.6.1. The ousting of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat with concomitant ecological repercussions.

During the construction phase, a high level of disturbance is likely to arise over a period extending up to 18 months. Such disturbance will relate to excavation, noise and general anthropogenic influences associated with the building of the facility on site. This may include the cutting and removal of vegetation for the establishment of internal gravel roads (a permanent transformation) and the cutting and trampling of vegetation wherever the arrays may be established. Direct, indirect and cumulative impacts expected to arise on site are identified below:

Direct Impacts

- Loss of "*less resilient*" plant species and replacement with more *robust* species leading to a change in habitat form and structure.
- Introduction of exotic vegetation or the invasion of disturbed areas by exotic vegetation through either a physical vector (e.g. machinery, vehicles etc.) or more "natural" dispersion vectors (e.g. wind, avian dispersion).
- Ousting of fauna through disturbance and human presence. As such, the loss of fossorial and other species will alter the ecological processes inherent within the site (e.g. change in disturbance thresholds, herbivory etc.).
- Opportunistic animal species may benefit from the construction activities; in particular the exclusion of predators from the site may benefit former prey species which will take refuge within the area, skewing populations and predator – prey relations.

Indirect Impacts

- Changes in habitat form and structure may extend beyond the site boundaries as species prevalence changes within the PV site. This change will skew plant competition in areas around the site as propagule levels change and species competition in the immediate vicinity of the site alters.
- As indicated in the direct impacts, faunal populations may be favoured by the establishment of the facility and as such these changes will be evidenced beyond the boundaries of the PV facility.

Cumulative Impacts

- Presently the study site and surrounds are subject to limited anthropogenic impacts with the exception of the adjacent electrical infrastructure, road infrastructure, fences and livestock management operations. A number of other photovoltaic power projects are approved and envisaged for the immediate region, as per Figure 16 above. A number of these projects may commence prior to the construction of Skeerhok 1, while others may not. Should these sites be developed prior to the development of the Skeerhok PV project, it is envisaged that:
    - Exotic species invasion may arise from adjacent projects (if not controlled on site), particularly as a consequence of both winds, livestock and anthropogenic movement; and
    - Fauna ousted from these sites may, in part relocate towards the subject site, and in turn be ousted from this site. As such faunal populations within the immediate region may be placed in flux. Such impacts should in the medium term, dissipate provided that suitable habitat remains available to such populations.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent; the indirect impact is rated with a local spatial extent, and the cumulative impact is rated with a local to regional spatial extent. The impacts are rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability of both the direct and cumulative impacts are respectively rated as substantial and very likely. The consequence and probability of the indirect impact are respectively rated as substantial and likely. The reversibility of the direct impact is rated as low and the irreplaceability is rated as low. The reversibility of both the indirect and cumulative impact is rated as moderate and the irreplaceability is rated as low.

Significance of Impact without Mitigation: **Moderate**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. A preconstruction site walk-through should be undertaken shortly before commencement of construction and preferrably in or around February to March in order to identify any additional plant specimens of significance that may be evident on site. Such specimens may be relocated/removed (i.e. search and rescue) or avoided (with the relevant permits and approvals in place) prior to the commencement of construction.

2. The detailed design of the laydown footprint of the arrays should take consideration of the general drainage from the site, preventing the unnecessary impeding of flow, particularly at the more southern points of the site, closer to the watershed. Any significant plant specimens that may be identified prior to the commencement of construction should be given consideration either in respect of removal, preservation or relocation. Other features of the site should be incorporated into the PV array design.

3. Although the area remains generally unaffected by significant exotic weed invasion, an initial pre-construction clearance of all exotic vegetation on site should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase and may be incorporated into an exotic weed control plan for the site.

4. The ousting of larger game from fenced areas within the PV facility, should be undertaken through a general sweep of the laydown area once the fence is erected. Species that are likely to remain within the site include steenbok and fossorial species such as aardvark.

5. The maintenance of vegetation and avoidance of the “blading” or clearance of vegetation by machinery. Vegetation is generally of such low level that blanket clearance is unnecessary.

6. Consideration of the siting and layout of the temporary construction site and worker camp.

Significance of the impact with mitigation **Low**

1.6.2. Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure within the site and immediately adjacent to it.

Significant drainage features on site will be avoided in the layout of the proposed PV facility. It is however, evident that some surface flow change will arise on account of excavation, plant and human movement and the placement of structures. Direct, indirect and cumulative surface hydrological impacts expected to arise on site are identified below:

Direct Impacts

- Minor variation in the flow regimen within small dendritic drainage features is likely to arise, but such change may possibly be compounded within larger features, that lie ostensibly off site.
- Increased sediment discharge into surface drainage features as a consequence of disturbance to soils and moderate to heavy rainfall. This may alter habitat for certain species that are related to the drainage lines.

Indirect Impacts

- Shifts in habitat form and structure as plant – water relations change across portions of the site.

Cumulative Impacts

- Sustained changes in the upper drainage pattern and watershed will see minimal changes in the major drainage lines. This may be compounded further downstream in the Brakrivier system, particularly if other, similar developments within the same catchment arise. Changes may be manifest in the increased rate of flow within the system with consequences in terms of bed and bank morphology.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent; the indirect impact is rated with a local spatial extent, and the cumulative impact is rated with a regional spatial extent. The direct, indirect and cumulative impacts are respectively rated with a medium-term, short-term and long-term duration. The consequence and probability of both the direct and indirect impacts are respectively rated as moderate and likely. The consequence and probability of the cumulative impact are respectively rated as substantial and likely. The reversibility of the direct and indirect impact is rated as high, whilst the cumulative impact is rated with a low reversibility. The irreplaceability of the direct and indirect impact is rated as low, whilst the cumulative impact is rated with a moderate irreplaceability.

Significance of Impact without Mitigation (Direct and Indirect Impacts): Low

Significance of Impact without Mitigation (Cumulative Impacts): Moderate

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Exclusion of major drainage lines from the development footprint. This has ostensibly been achieved as a consequence of the nature of the site and the selection of areas within the Skeerhok complex for the establishment of the PV facility.

2. Avoidance of significant sculpting of land and maintenance of the general topography of the site.

3. Engineering interventions such as the placement of energy dissipaters (such as stone levees or similar structures) within minor drainage lines affected by the PV facility, to reduce velocity of flow through such features.

4. Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible).

5. Maintenance of a high level of housekeeping on site during the construction phase.

6. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.

Significance of Impact with Mitigation (Direct and Indirect Impacts): Very Low

Significance of the impact with mitigation (Cumulative Impact): Low

1.6.3. Alteration of surface water quality on account of construction activities that lead to change in water chemistry.

Allied to the above, the construction phase will result in changes in water chemistry that will relate to:

Direct Impacts

- The physical alteration of surface run off (sediments, turbidity etc.).
- A change in dissolved substances within surface waters on account of the excavation of onsite soils and the import of soils and hardpan materials to site.
- A change in dissolved substances within the surface waters due to spillage of hydrocarbons and disposal of other liquids and foreign materials on site.
- Solid wastes, in particular plastics and paper, arising from site, are likely to arise within drainage systems.

Indirect Impacts

- Water quality in the lower reaches of the Brakrivier and Soutrivier systems may be subject to minor alteration in water chemistry, dependent upon rainfall in the catchment.

Cumulative

- The run off from all PV facilities as well as other infrastructure, whether developed in tandem or subsequent to one another, will see small changes in water chemistry associated with run off from these sites.
- Changes in water chemistry will be more evident in the permanent water bodies, downstream of the sites; however dilution factors will make these particular impacts negligible.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct and indirect impacts are rated with a local spatial extent; whilst the cumulative impact is rated with a regional spatial extent. The direct and indirect impacts are rated with a short-term duration, and the cumulative impact is rated with a long-term duration. The consequence and probability of both the direct and indirect impacts are respectively rated as slight and likely. The consequence and probability of the cumulative impact are respectively rated as moderate and likely. The reversibility and irreplaceability of both the direct and indirect impacts are respectively rated as high and low. The reversibility and irreplaceability of the cumulative impact are rated as moderate. The irreplaceability of the direct and indirect impact is rated as low, whilst the cumulative impact is rated with a moderate irreplaceability.

Significance of Impact without Mitigation (Direct and Indirect Impacts): Very Low

Significance of Impact without Mitigation (Cumulative Impact): Low

Mitigation:

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Undertaking and completion of earthworks and road construction outside of the high rainfall period in January to March if possible and practical.

2. Maintenance of a high level of housekeeping on site during construction, including management and maintenance of vehicles, storage of dangerous goods including bulk liquids and disposal of wastes.

3. Inspection of drainage features immediately outside of the footprint of proposed PV facility and undertake removal of solid waste materials (if identified) on a regular basis.

4. Exclusion of major drainage lines from the development footprint.

5. Avoidance of significant sculpting of land and maintenance of the general topography of the site.

6. Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features.

Significance of Impact with Mitigation (Direct and Indirect Impacts): Very Low

Significance of the impact with mitigation (Cumulative Impact): Very Low

1.6.4. Depending upon the origin of water (import or through abstraction of groundwater), changes in subsurface water resources may arise, particularly in the case of the latter.

The construction of the proposed PV facility will require significant volumes of water, particularly for the construction of roadways. If local boreholes are utilised for the provision of such water, these resources may be placed under pressure, while the import of water to the site may alter the recharge of water to subsurface resources.

Direct Impacts

- Abstraction from site is unlikely as the aquifer is considered to be low to moderate in yield at a preliminary level of consideration. However, increased demand on these aquifers will serve to reduce water availability, if such aquifers are located close to the surface. Such draw down of the aquifer may alter the plant water relations of larger specimens that rely on such resource.
- The introduction of water to site by import may alter the availability of water to plants within the site and may lead to changes in habitat form and structure around areas that receive such import.

Indirect Impacts

- Abstraction of water from subsurface resources may have consequences for areas beyond the site perimeter, depending on the extent of the aquifer under consideration. Depletion of the aquifer may affect habitat forms at lower points within the catchment.

Cumulative Impacts

- Continued and sporadic abstraction of water by a number of users from the same aquifer may affect water resources downstream of the site, as well as the availability of water to other sites.

The status of this impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and likely. The reversibility and irreplaceability of the impact are both rated as moderate.

Significance of Impact without Mitigation **Moderate**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Identification of suitable water resources, preferably off site and not utilized by other PV facilities, if possible. Confirmation of yield will be required prior to abstraction.

2. Use of recycled water for construction purposes from identified resources e.g. sewerage facilities or similar facility, if possible.

3. Identify or consider alternative cleaning methods for the PV panels, that are less water intensive.

Significance of the impact with mitigation **Low**

1.6.5. Changes in edaphics (soils) on account of excavation and the import of soils, leading to the alteration of plant communities and fossorial species in and around these points.

The construction phase will include the import of soils from other sites, as well as the compaction of soils. The related direct, indirect and cumulative impacts are identified below.

Direct Impacts

- Depending upon the nature of soils (particle size, clay and mineral content etc.) changes in habitat form may arise at a localized level, as plant species that are tolerant of or prefer particular soils benefit at the expense of other species which are less tolerant.
- Compaction of soils by traffic and through the use of compactors, will allow for some plant species to competitively benefit over other species.

Indirect Impacts

None identified, unless soils are disturbed outside of the development footprint.

Cumulative Impacts

- In a sandy environment, such as the Bushmanland Arid Grassland, differing soil forms will see some plant species benefit at the expense of others. With a number of similar projects underway within close proximity of each other, associations of particular species may become more prevalent on site, in clustered areas within the development sites.

The status of the direct impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as low.

Significance of Impact without Mitigation (Direct and Cumulative Impacts): Low

Significance of Impact without Mitigation (Indirect Impact): Very Low

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Ripping of compact soils when and where extensive compaction arises.

Significance of the impact with Mitigation (Cumulative Impacts): Very Low

Significance of Impact with Mitigation (Direct Impact): Low

1.6.6. Increased electrical light pollution (ELP), leading to changes in nocturnal behavioural patterns amongst fauna.

As indicated above, operations at the site during the construction phase will require the placement of security lighting, as well as the undertaking of operations at dusk and before dawn. Lighting will be required at points around the site.

Direct Impacts

- Increased lighting around the laydown area and possibly across the site will change faunal behavior. Nocturnal and crepuscular species may either benefit or be suppressed as a consequence of such lighting. For example, Chiropterans (bats) may be encouraged or attracted to site as a consequence of increased prey items being present in and around lighting, or certain species may become more vulnerable to predation as a consequence of lighting.

Indirect Impacts

- As a consequence of lighting at the site, species may be drawn from other areas or alternatively ousted from points proximal to the site as a consequence of changes in behavior of one or more species, affected by ELP.

Cumulative Impacts

- With a number of PV projects being clustered in the area, it is envisaged that the ELP and the presence of a wider landscape based light imprint or “aura” may become a significant component of the regional environment. This may serve to change faunal behavior over a wide portion of the area in question.

The status of the direct impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as very low.

Significance of impact without mitigation (Direct Impact): Low

Significance of impact without mitigation (Indirect and Cumulative Impacts):
Very Low

Mitigation

1. Lighting and its placement and use on site should be given consideration, whereby ELP is minimized. This may entail managing the position of lights, their direction and luminescence. The project should strive to minimise ambient situational light emissions.

Significance of impact with mitigation (Direct, Indirect and Cumulative Impacts):
Very Low

1.6.7. Exclusion or entrapment of (in particular) large fauna on account of the fencing of the site.

The placement of a fence around the site is one of the preliminary tasks affecting the site. Such fence serves to entrap some species within the laydown area, while other specimens can "escape", (Figure 20) others still, are enticed into the fenced area. This has some minor impacts, which are identified below.

Figure 20: Excavation and movement under fences by larger animals, porcupines and Aardvark (*Orycteropus afer)*.

Direct Impacts

- Fossorial species, such as aardvark (*O. afer*), can disrupt activities through their foraging activities. This is particularly evident around fences.
- The exclusion of some fauna serves to alter habitat state as the fossorial behavior of some fauna is an ecological process requirement (e.g. excavation of soils by some animals allows for the settlement and germination of seeds, while termites etc. are controlled by species such as *aardvark*.

Indirect Impacts

- The ousting of certain fauna from the site requires that such specimens forage within other areas, resulting in various behavioural changes (e.g. territorial overlaps etc.).

Cumulative Impacts

- As a large and contiguous area will eventually fall under a similar land use, with exclusion areas for larger fauna, inter-specific and intra-specific competition may increase within the local area.

The status of the direct impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as very low.

Significance of impact without Mitigation (Direct, Indirect and Cumulative):
Very Low

Mitigation

1. Ensure that the live electrical fence wire is not placed at ground level.

2. Conduct regular inspections of the fence line, possibly combined with the daily security inspections, to address any animals that may be affected by the fence (i.e. tortoise) and alert the site management team of any concerns.

Significance of impact with Mitigation (Direct, Indirect and Cumulative):

Very Low

Operational Phase

1.6.8. Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility i.e. larger fossorial species and predators will be excluded from the PV facility site by virtue of its fencing, generally leading to possible variations in populations of other species that remain within the site, with concomitant ecological change.

As per the construction phase impacts, impacts arising from the cordoning of the site from faunal intrusion may see changes in the general ecological state of vegetation structure and form on site. Potential direct, indirect and cumulative impacts are described below:

Direct Impacts

- Changes in plant community structure as drivers of certain species are excluded from the subject area, for example herbivory is curtailed on certain plant species.

- Introduction of exotic vegetation where moribund vegetation arises as a consequence of changes in local ecological drivers.

- Opportunistic animal species may benefit from the exclusion of other species, such as prey species. This may lead to a skewing of populations within the site.

Indirect Impacts

- Changes in habitat form and structure may extend beyond the site boundaries as species prevalence changes within the proposed PV site. This change will skew plant competition in areas around the site as propagule levels change and species competition in the immediate vicinity of the site alters.

- Faunal populations may be favoured by the establishment of the facility and as such these changes will be evidenced beyond the boundaries of the PV facility.

Cumulative Impacts

- Should the additional expected PV facilities be established, together with the subject site, it is evident that a significant portion of land will be subject to the exclusion of certain fauna, with the concomitant cumulative effects identified above being more spatially extensive in nature.

The status of the direct impact is rated as negative, with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the indirect impact without mitigation is rated as moderate.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the cumulative impact without mitigation is rated as moderate.

Significance of impact without mitigation (Direct Impact) Low

Significance of Impact without Mitigation (Indirect and Cumulative Impact): Moderate

Mitigation

1. Provision of critter paths within the fencing should be considered in the design. Similar paths have been instituted in other PV facilities to good effect. Its use relates primarily to the movement of small mammals (suricates and ground squirrel) as well as the Giant African bullfrog (*Pyxicephalus adspersus*). These species have been noted to utilise the critter paths (Figure 21), however burrowing and other activities continue in respect of larger fauna, regardless of such mechanisms.

2. Promote and support faunal presence and activities within the proposed PV facility, where applicable. For example, the retention of suricate warrens (within reason) and possibly low, endoreic pans, where they may arise.

Significance of impact with Mitigation (Direct, Indirect and Cumulative)

Low

Figure 21. Image of 'critter path" within fence. Note spoor of smaller animals indicating use of this pathway.

1.6.9. Increased shading and changes in surface water flow, as a consequence of the PV arrays, will lead to changes in plant-water relations and possible changes in plant community structures within the site.

The arrangement of the arrays across site will result in increased shading of large tracts of land while drip and flow regimen will alter. As a consequence, surface water availability on site will change, altering plant-water relations (Figure 22). In addition, the exclusion of both livestock and other herbivores may result in medium to long term changes in habitat form and structure. The following impacts are forecast:

Figure 22. Image indicating rilling and plant invasion in rill under PV module. Habitat form and structure will change on site as a consequence of the establishment of PV modules

Direct Impacts

- Minor changes in habitat composition, as certain species are ousted and others favoured as a consequence of the change in improved plant-water relations.
- Increased verdant growth in some species lying below the arrays.
- Reduced herbivory may give rise to changes in plant composition and structure on site.

Indirect Impacts

- With herbivory reduced and improved plant-water relations within large areas of the park, the area may act as a natural propagule repository for certain plant species, particularly those normally subject to grazing by livestock.

Cumulative Impacts

- As a number of PV projects will span a significant portion of contiguous land, and if all impacts are similar across these sites, then it may be expected that the above changes in habitat will encompass a significant portion of the surrounding environment.

- A large scale seed repository, free from intensive grazing pressures will be established within the region.

The status of the direct impact is rated as neutral with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and short-term duration (i.e. the impact and risk will be experienced for less than 1 year). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a site spatial extent and medium-term duration (i.e. the impact and risk will be experienced for 1-10 years). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as low.

Significance of impact without mitigation (Direct and Indirect Impacts): Very Low

Significance of impact without mitigation (Cumulative Impact): Low

Mitigation

1. None identified.

Significance of impact with mitigation (Direct and Indirect Impacts): Very Low

Significance of impact with mitigation (Cumulative Impact): Low

1.6.10. Changes in meteorological factors at a local scale, on account of the proposed PV array are likely to arise (e.g. subtle changes in wind dynamics, "heat bubble phenomenon" as well as the alteration in run off of surface water and evapotranspiration states), leading to long term, but generally latent changes in habitat.

Direct Impacts:

- The abovementioned "heat bubble" may alter behavioural patterns in some avian species, particularly raptors and larger species that utilize thermals. The consequence of such changes are however unknown.

Indirect Impacts:

- Subtle behavioural change in species within the region as certain species seek to benefit from aspects such as "heat bubble" phenomenon or change in surface water flow regime.

Cumulative Impacts:

- Increasing numbers of PV facilities may serve to make such behavioural / ecological changes more pervasive across the region.

The status of the direct impact is rated as neutral with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

Significance of impact without mitigation **Very Low**

Mitigation measures

None identified.

Significance of impact with mitigation **Very Low**

1.6.11 Potential abstraction of groundwater for the cleaning of modules, as well as operational use, will alter the state of subsurface water resources, depending upon nature and origin of such water.

It is doubtful if the requisite amount of water required for the cleaning of the PV panels is available on site; however the following impacts are forecast. Should groundwater be selected as the source of water for panel cleaning, the impact of the proposed project on groundwater and the geohydrology will be assessed as part of a separate specialist study.

Direct Impacts

- Increased demand on local aquifers will serve to reduce water availability, if such aquifers are located close to the surface. Such draw down of the aquifer may alter the plant-water relations of larger specimens that rely on such resource e.g. *A. erioloba*.

Indirect Impacts

- Abstraction of water from subsurface resources at the rate required may have consequences for areas beyond the site perimeter, depending upon the extent of the aquifer under consideration. Depletion of the aquifer may affect habitat forms at lower points within the catchment.

Cumulative Impacts

- As a number of PV facilities will be in operation in and around the identified aquifers, continued and regular abstraction of water by a number of users from the same aquifer(s) may affect water resources downstream of site, as well as the availability of water to other sites.

The status of the direct impact is rated as negative with a local spatial extent and very short-term duration (i.e. the impact and risk will be instantaneous). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are both rated as moderate. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and short-term duration (i.e. the impact and risk will be experienced for less than 1 year). The consequence and probability of the impact are respectively rated as substantial and likely. The reversibility and irreplaceability of the impact are both rated as moderate. The significance of the indirect impact without mitigation is rated as moderate.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as severe and likely. The reversibility and irreplaceability of the impact are respectively rated as moderate and low. The significance of the cumulative impact without mitigation is rated as high.

Significance of impact without mitigation (Direct Impacts): Very Low
Significance of impact without mitigation (Indirect Impacts): Moderate
Significance of impact without mitigation (Cumulative Impact): High

Mitigation

1. Preferential use of recycled water arising from sewerage treatment facilities for operational phase requirements (instead of groundwater) where this may be available.

2. The prudent use of surface water resources where management and monitoring are more achievable than subsurface resources.

3. Adopt “dry” cleaning methods, such as dusting and sweeping the site before washing down.

4. Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol on site.

5. Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers i.e. cleaning is undertaken throughout the year rather than at singular intervals at select times of the year.

Significance of impact with mitigation (Direct Impacts): Very Low
Significance of impact with mitigation (Indirect Impacts): Low
Significance of impact with mitigation (Cumulative Impact): Moderate

1.6.13. The fencing of the site, possibly with electric fencing, is likely to impact upon faunal behaviour, leading to the exclusion of certain species and possible mortalities (Figure 23). Alternatively, such changes may also favour some specific individuals, particularly those that remain within the confines of the PV facility, which is likely to lead to further localised alteration of habitat and ecological process within the proposed PV facility.

Figure 23**: Night Jar (*Caprimulgus rufigena*) electrocuted on energised electric fence.**

Direct Impacts:

- As indicated above, the introduction of infrastructure into the area will change faunal behaviour. Electric fencing, the preferred method of securing PV facilities can have significant negative consequences for in particular, tortoise, small passerine birds and reptiles such as snakes. These species, if coming into contact with the charged wires of the fence can be severely maimed or killed. Tortoises, if moving up to an electric fence are unable to move away from the fence if they are unable to extend their head and neck. As a consequence, tortoises are particularly susceptible to death through starvation if encountering an electric fence with a positive wire in or around ground level.

Indirect Impacts:

None identified

Cumulative Impacts:

- As a large area of land will be affected by multiple PV facilities, it is evident that any mortalities and injury associated with electrocution from fencing may be compounded.

The status of the direct impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

Significance of impact without mitigation **Low**

Mitigation

1. Ensure that the live electrical fence wire is not placed at ground level.

2. Conduct regular inspections of the fence line to address any animals that may be affected by the electric fence (i.e. tortoise).

Significance of impact with mitigation **Very Low**

Decommissioning Phase

The decommissioning phase is expected to see a reversion to an agricultural land use akin to the present state or alternatively some other agricultural activities. As such the structures on site will be removed, in particular the photovoltaic arrays.

1.6.14. A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise.

During the decommissioning phase, the potential impact of reverting to the present seral stage has been identified.

The spatial extent of this impact is site specific with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the impact without mitigation is rated as low.

Significance of impact without mitigation **Low**

No mitigation measures have been identified.

1.6.15 The reversion of present faunal population states within the study area to a previous state.

With the removal of infrastructure from site, areas of exclusion as well as anthropogenic influences on population states and presence within the site will alter accordingly. Such alteration will see species excluded from the area under a PV facility (larger mammals in particular), access areas from which they were previously excluded. Habitat change on site will influence population trends and traits within the area.

The spatial extent of this impact is site specific with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as low.

Significance without mitigation **Low**

No mitigation measures have been identified

1.6.16 Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment;

As infrastructure is removed from site, surface hydraulics will change in site. Habitat changes associated with the reversion to an agricultural land use will see concomitant changes in the geomorphological state of both major and minor drainage lines, resulting from an equilibria shift.

The spatial extent of this impact is local with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as low.

Significance of impact without mitigation **Low**

No mitigation measures have been identified

1.6.17 Exotic weed invasion as a consequence of the abandonment of site and cessation of weed control measures

Exotic weed invasion is a likely consequence following the cessation of the PV facility operations. Decommissioning of site will see increased disturbance of the land and therefore increased susceptibility to exotic weed invasion.

The spatial extent of this impact is local-regional with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as medium.

Significance without mitigation **Moderate**

Mitigation

Mitigation would include monitoring of the land and redress of exotic weeds found present on site. In addition, the stabilisation of disturbed lands immediately after the clearance of the land of the PV arrays and related infrastructure would serve to moderate the potential for invasion.

Significance with mitigation **Low**

1.7. IMPACT ASSESSMENT SUMMARY

Table 6-1 Direct impacts assessment summary table for the Construction Phase

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	Detailed design and incorporation of habitat and features Plant rescue operations Exotic weed control Game sweep of site The maintenance of vegetation and avoidance of the "blading" or clearance. Consideration of the siting and layout of the temporary construction site and worker camp	Moderate	Low	4	High

Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Site	Medium-Term	Moderate	Likely	High	Low	Avoidance of major drainage features during construction Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible). Avoidance of significant sculpting of land and maintenance of the general topography of the site Maintenance of a high level of housekeeping on site during the construction phase. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.	Low	Very low	5	High
Abstraction from subsurface aquifers may have a significant impact on plant water relations.	Water volume and ecological change	Negative	Local	Long term	Moderate	Likely	High	Low	Alternative water resources to be utilized	Very low	Very Low	5	Medium

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The introduction of water to site by import may alter the availability of water to plants within the site and may lead to changes in habitat form and structure around areas that receive such import.	Change in plant water relations	indeterminate	Local	Long term	Slight	Likely	High	Low	None identified	Very Low	Very Low	5	High
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	Avoidance of significant sculpting of land and maintenance of the general topography of site. Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features.	Very low	Very low	5	Medium
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Site	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Low	Low	4	Medium

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Increased ELP, leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Moderate	Very likely	High	Low	Reduce level of lighting and placement of lighting to be judiciously considered at time of implementation .	Low	Very low	5	High
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Site	Long term	Slight	Very likely	High	Low	Ensure that the live electrical fence wire is not placed at ground level. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence	Very low	Very low	5	High

Table 6-2 Indirect impact assessment summary table for the Construction Phase

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local	Long-Term	Substantial	Likely	Moderate	Low	Detailed design and incorporation of habitat and features Plant rescue operations Exotic weed control Game sweep of site The maintenance of vegetation and avoidance of "blading" or clearance. Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High

Construction Phase													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Local	Short term	Moderate	Likely	High	Low	1.Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible). 2.Avoidance of significance sculpting of land and maintenance of the general topography of the site. 3 Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features. 4. Maintenance of a high level of housekeeping on site during the construction phase.	Low	Very low	5	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
									5. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.				

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	Exclusion of major drainage lines from the development footprint. Avoidance of significant sculpting of land and maintenance of the general topography of site. Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features. Maintenance of a high level of housekeeping on site during the construction phase. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.	Very low	Very low	5	Medium

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Very low	Very low	5	Medium
Increased ELP, leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	Provision of critter paths within fencing should be considered in the design. Promote and support faunal presence and activities within the proposed PV facility, where applicable.	Very low	Very low	5	High

Construction Phase													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Local	Long term	Slight	Likely	High	Low	Ensure that live electrical fence wire is not placed at ground level. 2. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence	Very low	Very low	5	High

Table 6-3 Direct Impact assessment summary table for the Operational Phase

Operational Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Moderate	Very likely	High	Low	Provision of critter paths within the fencing should be considered in the design. Promote and support faunal presence and activities within the proposed PV facility	Low	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very low	Not Applicable	5	High
Changes in meteorological factors at a local scale, on account of the PV array are likely to arise	Uncertainty in relation to change	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very Low	Not Applicable	5	High

Operational Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources	Water quantity changes with possible impact on habitat	Negative	Local	Very short term	Substantial	Likely	Moderate	Moderate	Preferential use of recycled water sources for operational phase requirements (instead of groundwater). The prudent use of surface water resources. Adopt "dry" cleaning methods, such as dusting and sweeping the site before washing down. Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol. Low level and ongoing cleaning of PV panels over time to reduce demand on aquifers.	Moderate	Low	4	High

Operational Phase													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behaviour.	Change in animal behaviour	Negative	Local	Long term	Slight	Unlikely	High	Low	None identified	Very low	Not applicable	5	Medium
The fencing of the site, possibly with electric fencing, is likely to impact on faunal behaviour, leading to the exclusion of certain species and possible mortalities	Animal mortality	Negative	Site	Long term	Moderate	Likely	High	Low	Ensure that the live electrical fence wire is not placed at ground level. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by electric the fence.	Low	Very low	5	High

Table 6-4 Indirect Impacts for the Operational Phase

Operational Phase													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	Provision of critter paths within the fencing should be considered in the design. Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Negative	Local	Short term	Slight	Likely	High	Low	None identified	Very low	Not Applicable	5	High

Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources	Water quality change and general pollution of resource	Negative	Local	Short term	Substantial	Likely	Moderate	Moderate	Preferential use of recycled water sources for operational phase requirements (instead of groundwater). The prudent use of surface water resources. Adopt "dry" cleaning methods, such as dusting and sweeping of the site before washing down. Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol. Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers.	Moderate	Low	4	High

Table6-5 Cumulative Impact assessment summary table for the Construction Phase

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local to Regional	Long-Term	Substantial	Very likely	Moderate	Low	Detailed design and incorporation of habitat and features Plant rescue operations Exotic weed control Game sweep of site The maintenance of vegetation and avoidance of the “blading” or clearance. Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Change in drainage patterns and drainage features	Negative	Regional	Long-Term	Substantial	Likely	Low	Moderate	Exclusion of major drainage lines from development Avoid sculpting of land Surface flow energy dissipaters Maintenance of a high level of housekeeping on site during the construction phase. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.	Moderate	Low	4	High

Alteration of surface water quality that leads to change in water chemistry	Changes in drainage patterns and water quality	Negative	Regional	Long term	Moderate	Likely	Moderate	Moderate	Avoid construction during the rainy season (if possible and practical). 2.Avoidance of significance sculpting of land and maintenance of the general topography of the site including the avoidance of major drainage lines. 3.Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features Apply good site management and solid waste management outside of site (within the immediate vicinity)	Low	Very Low	4	Medium
Changes in sub surface water resources may arise	Effects upon groundwater resources	Negative	Regional	Long term	Substantial	Likely	Moderate	Moderate	Identify off site water resources Use of recycled water Identify or consider alternative cleaning	Moderate	Low	4	Medium

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
									methods for the PV panels				
Changes in edaphics on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species	Habitat alteration	Negative	Regional	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Low	Very low	5	Medium
Increased ELP	Faunal behavioural change	Negative	Regional	Long term	Slight	Likely	High	Low	Review the placement of lighting on the site.	Very low	Very low	5	Medium
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site	Animal mortality	Negative	Regional	Long term	Slight	Likely	High	Low	Placement of live wires Monitoring of fence line	Very low	Very low	5	Medium

Table 6-6 Cumulative Impact assessment summary table for the Operational Phase

Operational Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility	Habitat and species loss	Negative	Regional	Long-Term	Substantial	Very likely	Low	Low	Provision of critter paths within the fencing should be considered in the design. Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Exposed soil susceptible to erosion	Negative	Site	Medium-Term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	High

Operational Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources.	Changes in water resource quantity and perhaps quality	Negative	Regional	Long term	Severe	Likely	Moderate	Low	Preferential use of recycled water for operational phase requirements (instead of groundwater). The prudent use of surface water resources. Adopt “dry” cleaning methods, such as dusting and sweeping of the site before wash down. Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol. Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers.	High	Moderate	3	Medium

Operational Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
As a large area of land will be affected by multiple PV facilities, it is evident that any mortalities and injury associated with electrocution from fencing may be compounded	Cumulative change in faunal populations	Negative	Regional	Long term	Slight	Likely	High	Low	Management of potential sources of electrocution – electric fences	Low	Very low	5	High

Table 6-7 Decommissioning Phase Impact assessment summary table

Decommissioning Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise;	Habitat and species change	Neutral	Site	Long-Term	Moderate	Very likely	Low	Low	None identified	Low	Not Applicable	4	Medium
A reversion of present faunal population states within the study area; .	Habitat and species population change	Neutral	Site	Long term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	Medium
Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment;	Surface hydrology change	Neutral	Local	Long term	Moderate	Very likely	High	Low	None identified	Low	Not Applicable	4	Moderate
Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures	Habitat change	Negative	Local - Regional	Long term	Moderate	Very likely	High	Low	Weed control and land management	Moderate	Low	4	High

1.8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Utilising the above information the following broad issues are considered within the Environmental Management Programme that would be associated with the proposed development.

Pre-Construction:

- Pre-construction evaluation and possible plant rescue operations;
- Identification of intrusion of the proposed construction site and development footprint, into minor drainage lines (if any);
- Identification of laydown areas, roadways etc. on site and evaluation of affected points within site, particularly in respect of floral and faunal presence; and
- Permitting requirements in terms of the National Water Act and Northern Cape Conservation Act.

Construction Phase:

- Site induction and interaction within management on ecological aspects;
- Site inspection of any fauna within the construction area during post fencing completion;
- Monitoring of operations, including species presence within site, mortalities and sitings;
- Maintenance of vegetation and avoidance of unnecessary clearance of site;
- Exotic weed management; and
- Erosion control measures to be implemented where applicable.

Operational Phase:

- Monitoring of faunal activities within the fenced area of the site and immediate proximity of site;
- Management of faunal intrusion through the fencing, including possible mortalities;
- Consideration of lighting regime around the site and the impact of ELP.
- Vegetation management on site – consideration of redress methods of growth and habitat form around site;
- Exotic weed management; and
- Erosion control measures.

1.9. CONCLUSION AND RECOMMENDATIONS

The ecological evaluation of the proposed Skeerhok PV 1 site included a comparative review of the entire property on the relevant portion of the Farm Smutshoek 395 which lies within the proposed Skeerhok PV complex. Such evaluation included consideration of the bio physical state of drainage systems, topographical features and a holistic review of all components within the ecological landscape. The evaluation of the results of desktop and field reconnaissance identified and served to develop a plan for the exclusion of particular areas from any proposed development of a PV facility. Included in the assessment was consideration of terrestrial and hydrological systems, as well as fauna Major impacts identified as a consequence of the development proceeding relate to, *inter alia*;

- Changes in the broader habitat as a consequence of variation in physical factors within the site (e.g. shading of vegetation, changes in surface water flow regime);
- Changes in the broader surface and possibly sub surface hydrology; and
- The ousting, and in some cases, recruitment of species, with subsequent variation in populations in and around the development.

The ecological evaluation has determined that with the exclusion of the identified drainage line from the development, within the subject site, the requisite ecological components associated with these features will be retained in a broader perspective, with only subtle changes to the eco-geomorphology of these systems becoming evident on minor drainage features or where plant communities may have to be removed or relocated. There will be minor to moderate changes evident in the terrestrial environment resulting from the development, which in turn will be manifest in changes in faunal components of the environment.

None of the above impacts have been identified as being of high significance (with the implementation of mitigation measures); most impacts arising can be considered to be of low significance in a holistic evaluation.

Given the above information, it is evident that with the judicious placement of the proposed solar PV facility within the boundaries of the study area, this development cannot be precluded from the proposed Skeerhok land complex. As such, authorisation may be granted for the development of the site as a PV generation facility. Judicious management of the site should however include:

- Avoidance of major drainage lines to the north of the site and as identified in this report;
- Avoidance of excessive clearance of vegetation within the site;
- Management of exotic weed invasion that may arise;

- Management of fauna within the site and surrounds, as well as the incorporation of “wildlife” porosity into fence lines and the implementation of measures on the energised fence line to avoid mortalities to wildlife; and
- General land management practices to avoid excessive erosion, dust emissions and possible sources of pollution to ground and surface water resources.

The above, along with the various mitigation measures espoused in this report should be incorporated as conditions, into any authorisation granted by the relevant authority.

It is our opinion that with the implementation of the above, the project proposal, subject to final design and adherence to the above recommendations, can be accommodated on site and should therefore be sanctioned by the appropriate authorities.

1.10. REFERENCES

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